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OCCASIONAL PAPERS

OF THE

CALIFORNIA ACADEMY OF SCIENCES,

I.

A REVISION

OF THE

South American Nematognathi

OR CAT-FISHES

BY

CARL H. EIGENMANN, Ph. D.

AND

ROSA SMITH EIGENMANN,
(Curator of Fishes, California Academy of Sciences.)

SAN FRANCISCO:
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INTRODUCTORY.

In this paper we have endeavored to give keys to the genera and species of Nematognathi ascribed to South America, to collect the synonymy and bibliography in full to date, and to give descriptions of the forms we have been able to examine. We have thought best to give full descriptions of most of the species in the Museum of Comparative Zoology for several reasons. Many of the forms are rare and contained only in a single museum; and full descriptions of those species in this museum will aid in identifications and revisions of this group by ichthyologists working in other museums. As yet scarcely more than the main streams of South America have been explored, and many new forms will doubtless appear when the smaller streams are searched; in that case detailed descriptions of as many as possible of the known species in some one work will be very desirable, especially since many descriptions are now to be found only in inaccessible journals. Furthermore, short diagnoses, although they may be excellent and quite sufficient at the time they are written, sometimes become worthless by the discovery of new species which agree with the old in all the characters given in the diagnosis, but differ from them in characters not mentioned.

We are fully in accord with the statement recently made by Dr. Cope that "descriptive zoology will never be complete until the structure is exhausted in furnishing definitions," and our only excuse for not treating in detail of the internal structure, especially the osteology of the siluroids, was the inability to mutilate series of specimens to make the necessary anatomical preparations, or to examine the osteological preparations already made.

Since 1864, the date of the publication of Dr. Günther's Catalogue of Fishes, no general work on the Nematognathi has appeared, while the number of nominal South American species has been greatly increased since that time.

The Central American Siluridæ, which properly belong to the South American fauna, have been omitted on account of a lack of material. The same reason has prevented us from giving more than lists of the genera Arges, Hemiancistrus and Chætostomus.

The material studied, several thousand specimens, belongs to the Museum of Comparative Zoology at Cambridge, Massachusetts, U. S. A., and was collected chiefly during the Thayer Expedition, a full account of which is given in Agassiz's "A Journey in Brazil."* Collections were made during this expedition in the coast rivers from Rio de Janerio to Rio Paranahyba, and in the Amazon and its tributaries from Para to Tabatinga. During this expedition a valuable collection was made by Senhor Vinhas in the Xingu. A collection made by Senhor Honorio in Goyaz is especially valuable as showing the relation between the fauna of the upper courses of the Tocantins with the fauna of the upper courses of the San Francisco, Parahyba, Rio Doce and Rio Jequitinhonha. The collection made by Senhor Honorio has not been examined before, and many of the forms are new.

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*A Journey in Brazil, by Prof. and Mrs. Louis Agassiz. Boston. Tichnor & Fields. 1868. Professor Agassiz was accompanied on this expedition by the following assistants: James Burkhardt, artist; John G. Anthony, conchologist; Frederick C. Hartt and Orestes St. John, geologists; J. A. Allen, ornithologist; Geo. Sceva, preparator; and the following volunteers: Newton Dexter, William James, Edward Copeland, Thomas Ward, Walter Hunnewell and S. V. R. Thayer.

A most valuable collection was made by His Majesty Dom Pedro II. in the Rio Grande do Sul, which has not been studied before, and many of the forms are new or otherwise interesting.

The collection of the Thayer expedition is by far the richest collection of fresh water fishes ever made in South America. It is scarcely necessary to enumerate here the advantages which would have accrued to American students and to this museum had this enormous collection been studied shortly after it was made. No systematic attempt has before been made to examine all the specimens of any of the families of fresh water fishes collected during this expedition. The result has been that most of the new forms having been rediscovered by other collectors the types of numerous species are now scattered through various museums in America and Europe which would be found in the Museum of Comparative Zoology if this collection had been studied at once. Even those specimens which have hitherto served as the types of new species are not so labeled, rendering very difficult the identification of the rest at this time.

A large collection was made during the Hassler expedition around South America; specimens were secured at Santiago, Callao and Panama. Part of this material had not been studied and has yielded new forms.

A valuable collection was made by Mr. Alexander Agassiz and Mr. Samuel Garman in Lake Titicaca. Many small collections came from private travellers. The names of the collectors are mentioned with the descriptions of the specimens.

We are indebted to Mr. Alexander Agassiz, the director of the Museum of Comparative Zoology, for the privilege of studying this material, and for the use of the museum libraries, and to Mr. Samuel Garman for aid in making the collection available for study. We wish to express our thanks to Miss Frances M. Slack of the museum library, and to Mr. Thomas J. Kiernan of the Harvard University library, for many favors.

To Dr. G. A. Boulenger of the British Museum, to Dr. E. D. Cope of Philadelphia, and to Mr. Alexander Thominot of the Jardin des Plantes, we are indebted for the examination of types. To Dr. David S. Jordan we are indebted for advice concerning some of the questions of nomenclature and other favors.

The species are numbered consecutively. Varieties have the letters "a," "b," "c," etc. attached to the number of their respective species. Doubtful species have the decimals ".1," ".2," ".3," etc., attached to the number of the valid species preceding.

In the descriptions the usual formulas have been employed. The length of the head is measured from the tip of the snout to the end of the bony opercle in all families but the Loricariidæ, in which it is measured from the tip of the snout to the end of the temporal plate. The length is measured from the tip of the snout to the base of the middle caudal rays. The "interocular" is measured between the nearest edges of the eyes, the "interorbital" between the nearest edges of the bony orbits. Unless otherwise stated, the color descriptions have been taken from alcoholic specimens.

In the matter of nomenclature we have followed the canons of the A. O. U. Code as far as possible and practicable.

Carl H. Eigenmann,
Rosa S. Eigenmann.

A REVISION OF THE SOUTH AMERICAN NEMATOGNATHI.

The order Nematognathi was established by Dr. Gill in 1870, and characterized by Dr. Cope as follows:

"Præcoracoid arch present. No coronoid or symplectic bones. Parietals and suproccipital confluent; four anterior vertebræ coössified, and with ossicula auditus. No mesopterygium. Basis cranii and pterotic bone simple; third superior pharyngeal bone wanting, or small and resting on the fourth; second directed backward. One or two pairs of basal branchihyals; two pairs of branchihyals. Suboperculum wanting, premaxillary forming mouth-border above. Interclavicles present."

As in Diplomystes the maxillary forms the mouth-border above, and the symplecticum is sometimes present (*fide* J. A. Ryder), a revision of this diagnosis is necessary.

Various views have been held as to the number of families into which the order ought to be divided. Cuvier, Valenciennes and Günther have united all the forms under the family name Siluridæ. Agassiz was the first to insist, in 1829, that the differences existing between some of the genera were of family value and separated his Goniodontes.

Bleeker, in 1858, divided the Siluridæ of Cuvier into four, and in 1864 into six families.

Cope in 1870 recognized three families, and Gill, in 1872, gave names to eleven families of Nematognathi.

Without critically examining non-American forms we recognized in 1888 seven families as inhabiting the Americas.

In 1890, we proposed to raise Diplomystes to family rank.*

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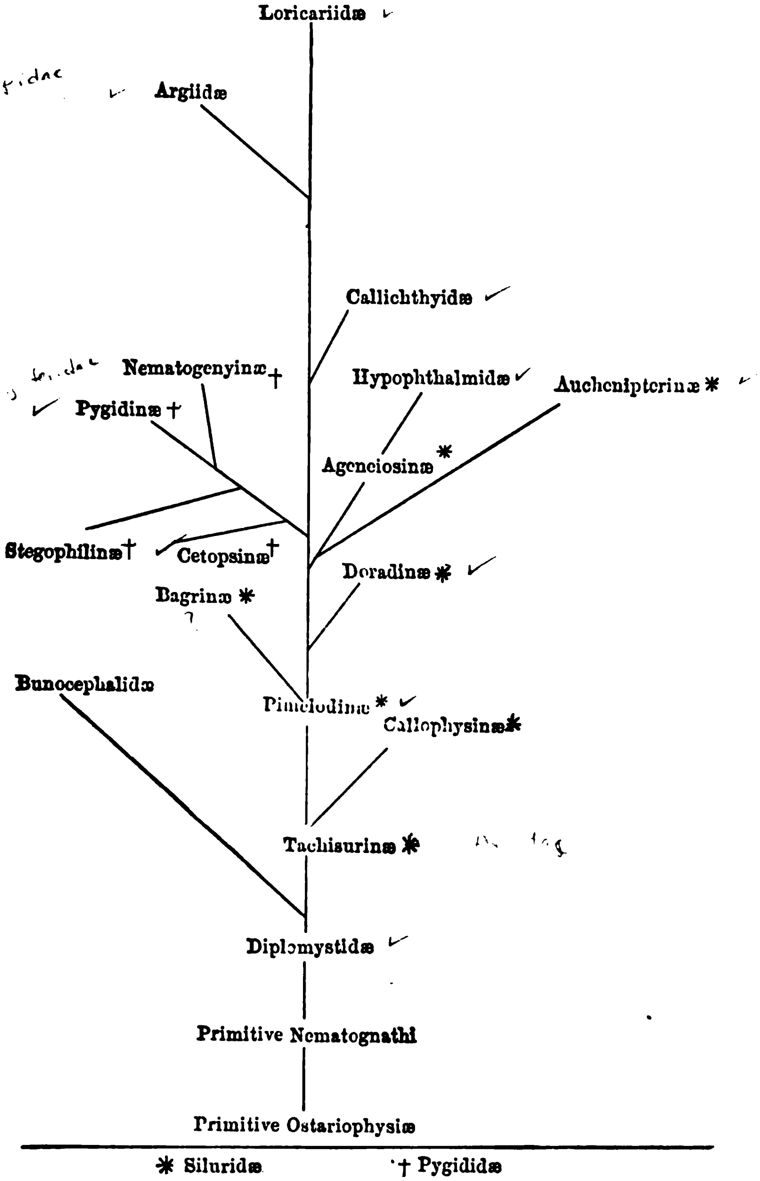
* A cursory examination of the skeletons of Asiastic forms leads us to believe that all the families named by Dr. Gill will probably be found tenable.

Seven of these families are confined to tropical America.

In several cases the gradation from one family to another is so gradual that the present classification may be looked upon as provisional. The inter-relation of the families and their subfamilies is illustrated in the diagram on opposite page.

The general distribution of these families and their subfamilies is as follows:

I. BUNOCEPHALIDÆ—Amazons from Para to Pebas, Nauta and Canelos; Guianas.
  BUNOCEPHALINÆ—Solimoens, Marañon; Guiana.
  PLATYSTACINÆ—Amazon; Guiana.
II. DIPLOMYSTIDÆ—Chile.
III. SILURIDÆ—Cosmopolitan.
  TACHISURINÆ—Atlantic and coast rivers from La Plata to North America; Pacific, from Callao to Mexico; Africa, Asia.
  CALLOPHYSINÆ—Amazons to Calderon; Guiana.
  PIMELODINÆ—Eastern rivers from La Plata to Mexico; western rivers from Callao to Mexico; Africa.
  DORADINÆ—Rio Plata; Rio San Francisco to Peru and Colombia. Not in Rio Parahyba, Rio Doce or Jequitinhonha.
  AUCHENIPTERINÆ—Rio Janeiro to Rio Magdalena and Peru.
  AGENEIOSINÆ—La Plata; Rio Paranahyba, to Guiana and Peru; not in Rio Parahyba, Doce or Jequitinhonha.
IV. HYPOPHTHALMIDÆ—Amazons from Para to Rio Huallaga; Guiana region.
V. PYGIDIDÆ—Chile and Argentine Republic north to Colombia; chiefly in mountain streams.



Helogeneidae
Ageneiosidae
Aspredinidae

Cetopsinæ—Amazons from Rio Cupai to its upper courses; Guayaquil (Irisanga?).

Pygidinæ—Mountain streams from Chile to Colombia; Amazons eastward to Cudajas; mountain streams of Southeastern Brazil and center of Argentine Republic.

Stegophilinæ—Brazil, chiefly in headwaters of rivers.

VI. Argiidæ—Andes of Peru, Ecuador and Colombia.

VII. Loricariidæ—Eastern slopes of South America from the Argentine Republic to Central America; western slopes of Ecuador and Colombia.

Loricariinæ—La Plata to the Orinoco and Rio Magdalena; both slopes of Panama.

Hypoptopominæ—Rio Janeiro and Rio Parahyba; Amazon from Rio Negro to Rio Ambyiacu; Venezuela.

Plecostominæ—Cordova; Rio Plata to Rio Magdalena; western slopes of Ecuador; both slopes of Panama.

VIII. Callichthiidæ—Rivers between La Plata and Orinoco; Amazons to Nauta.

ANALYSIS OF THE AMERICAN FAMILIES AND SUBFAMILIES OF NEMATOGNATHI.

a. Air bladder well developed, simple or with transverse constrictions (except in *Ageneiosus*); lying free in the abdominal cavity. Mouth terminal, teeth villiform, conical, incisor or molar-like; intestines short, arranged in longitudinal folds. Body naked or with a single series of lateral plates. Diaphragm membranaceous. Tip of scapular process touching basi occipital.

b. Dorsal and anal nearly co-extensive with the caudal portion of the vertebral column; opercle present. *Chacidæ*, *Plotosidæ*, *Clariidæ*. (Exotics.)

bb. Dorsal short, confined to the abdominal portion of the vertebral column.

c. Opercle none; adipose fin none; neural spines of the coalesced vertebræ forming a ridge from the occipital to the dorsal. Gill-opening reduced to a slit in front of the pectorals. Caudal vertebræ greatly compressed, their neural spines expanded. BUNOCEPHALIDÆ I.

a. Tail short, vent nearly equidistant from tip of snout and base of caudal. Anal with less than 10 rays ***Bunocephalinæ.***

aa. Tail long; vent in anterior third of body; anal with 50-60 rays. ***Platystacinæ.***

cc. Opercle well developed and movable; adipose fin normally present; occipital process sometimes forming a bony bridge from the occipital to the dorsal plate. Gill openings usually wide. Caudal vertebræ not compressed, the neural spines simple, spine-like.

d. Maxillary well developed, provided with teeth and forming the sides of the jaw; nares approximated; gill membranes somewhat joined, but free from the isthmus. DIPLOMYSTIDÆ II.

dd. Maxillary vestigiary, the intermaxillaries only forming margin of upper jaw. SILURIDÆ III.

a. Gill membranes usually entirely free, sometimes united and forming a free membrane across the isthmus, or in some species of *Tachisurus* joined to the isthmus.

b. Anal much shorter than the caudal portion of the vertebral column; nares without barbels.

c. Nares approximated (partly marine). ***Tachisurinæ.***

cc. Nares remote; barbels six; adipose fin well developed.

d. Teeth incisor-like, in two series in the upper, in a single series in the lower jaw. ***Callophysinæ.***

dd. Teeth villiform, in bands. *Pimelodinæ.*

aa. Gill membranes united and joined to the isthmus; nares remote, without barbels.

e. Air bladder lying free in the abdominal cavity; mallei turned outward behind, their tips greatly expanded, forming the anterior wall of the single air bladder; modified vertebræ without lateral processes.

f. A series of bony plates along the sides. *Doradinæ.*

ff. Sides naked. *Auchenipterinæ.*

ee. Air bladders vestigiary, almost wholly surrounded by bone, one on either side of the centrum of the modified vertebræ. Lateral processes of the modified vertebræ well developed. *Ageneiosinæ.*

aa. Air bladder vestigiary, one on either side of the coalesced vertebræ and entirely surrounded by a bony capsule.

e. Air bladder enclosed in a capsule formed by the lateral processes of the coalesced vertebræ, by the scapula, and by the process connecting the scapula with the basi occipital; the external opening of the air bladder capsule bounded by the scapula and lateral processes, its anterior side open. Adipose fin present, dorsal on anterior half of body over the anal which is scarcely shorter than the caudal portion of the vertebral column. Gill membranes entirely free from the isthmus. Nares without barbels. Derm naked. "Diaphragm" membranaceous.

HYPOPHTHALMIDÆ IV.

ee. Air bladder enclosed in a capsule formed by the lateral processes of the coalesced vertebræ only; the external orifice of the air bladder capsule as in *Hypophthalmidæ,* its anterior side closed. Adipose fin none; dorsal usually on the caudal, sometimes on the abdominal portion of the vertebral column;

anal short. Derm naked. Dorsal and pectoral spines scarcely developed.

PYGIDIDÆ V.

a. **Dorsal entirely in front of the ventrals; vomer with teeth; head compressed; anterior nares almost labial; gill membrane broadly united with the isthmus; air bladder capsule entirely free from the skull; occipital with a prominent process.** ***Cetopsinæ.***

aa. **Dorsal above or behind the ventrals; no teeth on vomer. Head depressed.**

b. **Gill openings broad, the gill membrane almost free or forming a free membrane across the isthmus; air bladder capsule joined to the skull.** ***Pygidinæ.***

bb. **Gill membrane confluent with the skin of the isthmus, the gill openings a narrow slit in front of the pectoral.** ***Stegophelini.***

eee. Air bladder enclosed in a capsule formed by the skull and by the lateral processes of the anterior vertebræ; diaphragm partly or wholly osseous, formed by the expansions of the clavicle and scapular process. Scapula and its process firmly joined to the skull. Gill membranes joined to the isthmus.

f. Derm naked, mouth inferior, lower lip reverted; teeth bicuspid, in several series.

ARGIIDÆ VI.

ff. Derm covered with bony plates.

g. Caudal vertebræ compressed, the neural and hæmal spines expanded forming a continuous ridge above and below. Sides with several series of plates. Mouth inferior, the lower lip reverted; teeth turned abruptly back above and usually expanded; a single series of teeth erect, the intermaxillaries and dentaries box-shaped, filled with numerous relay teeth; intestinal canal coiled. Cavity of the air bladder communicating with the exterior at a notch in the posterior margin of the temporal plate at the beginning of the lateral line. LORICARIIDÆ VII.

a. **Tail long, depressed, with a single series of plates on the sides; intestinal canal usually not much longer than the body.** ***Loricariinæ*.**

aa. **Tail short, compressed or rounded.**

  b. **Belly with two or three series of large plates.** ***Hypoptopominæ*.**

  bb. **Belly naked or with minute granular plates; intestinal canal many times as long as the body.** ***Plecostominæ*.**

gg. Caudal vertebræ normal, the neural and hæmal spines spike-like, separated from each other. Sides with two series of plates. Mouth terminal, lower lip not reverted; teeth villiform; cavity of the air bladder communicating with the exterior by means of a long narrow slit in the temporal plate and by the last of a series of slits below the long one.

CALLICHTHYIDÆ VIII.

FAMILY I. BUNOCEPHALIDÆ.

=*Aspredinoidei* Bleeker, Nederl. Tijdschr. Dierk. i, 1863, 117.

=*Aspredinina* Günther, Cat. Fish. Brit. Mus. v, 266, 1864.

=*Aspredinidæ* Gill, Arrangement of the Families of Fishes 19, 1872.

=*Bunocephalidæ* Eigenm. & Eigenm. Am. Nat. July, 1888.

Air bladder large, free in the abdominal cavity and touching the skin in the area bounded by the humeral process and by the lateral process of the anterior vertebræ. Anterior vertebræ coalesced, with broad lateral processes which are bent downward behind, their posterior margins strengthened and prolonged outward, touching the skin. Coracoid and humeral processes large. Teeth villiform, in bands on the jaws, none on the vomer; intestinal canal short. Derm naked. Mouth terminal or subterminal, never truly inferior. Anterior nares remote from the posterior, neither with a barbel. Gill membrane joined to the isthmus, the gill-opening reduced to a narrow slit in front of the pectoral. Dorsal short, placed over the ventrals. Pectoral with a strong spine; anal very variable.

Habitat: Whole course of the Amazons; Guiana.

The *Bunocephalinæ* are found in the upper and middle course of the Amazons and in Guiana, while the *Platystacinæ* are found only in the lower course of the Amazon (Para River) and in Guiana.

ANALYSIS OF THE GENERA OF BUNOCEPHALIDÆ.

a. Tail short; vent nearly equidistant from tip of snout and base of caudal. Anal with less than 10 rays. (BUNOCEPHALINÆ.)

b. Dorsal vestigiary, of 2 rays only; barbels 6; head broad and depressed, its depth less than that of the posterior portion of the compressed tail; anterior margin of the pectoral spine smooth. BUNOCEPHALICHTHYS I.

bb. Dorsal well developed, of 5 rays, the last of which is adnate; head deeper than the posterior portion of the tail.

c. Barbels 6. BUNOCEPHALUS II.

cc. Barbels 2, on the maxillaries only. DYSICHTHYS III.

aa. Tail long, with a median dorsal fold; distance of vent from tip of snout less than half its distance from base of caudal. A. 50–60. (PLATYSTACINÆ) PLATYSTACUS IV.

SUBFAMILY BUNOCEPHALINÆ.

I. BUNOCEPHALICHTHYS.

Bunocephalichthys Bleeker, Nederl. Tijdschr. Dierk. i, 1863, 118, (*hypsiurus*).

Type: *Bunocephalus hypsiurus* Kner.

This genus is characterized by its rudimentary dorsal fin.

Tail compressed, higher than broad; head lower than the tail; dorsal surface of the head with osseous protuberances. Outer surface of pectoral spine smooth, caudal rounded.

1. **Bunocephalichthys hypsiurus.**

Bunocephalus hypsiurus Kner, SB. Ak. Wien, xvii, 1855, 98, pl. 1, fig. 1. (Rio Branco.)

Bunocephalichthys hypsiurus Günther, Catal. Fish. Brit. Mus. v, 267, 1864 (copied); E. & E. Proc. Cal. Acad. Sci., 2d Ser. ii, 1889, 48. (Name only.)

Habitat: Rio Branco.

Protuberances of the head in two curved series; tail with undulating ridge above and below. Light yellowish spots along the lateral line; anal white edged. (Kner.)

II. BUNOCEPHALUS.

<*Bunocephalus* Kner, SB. Ak. Wien, xvii, 1855 (sp).

=*Bunocephalus* Bleeker, Nederl. Tijdschr. Dierk. i, 1863 (*verrucosus*).

Type: *Platystacus verrucosus* Bloch.

Dorsal well developed, of five rays, the last of which is adnate; tail terete or quadrangular. Upper surface of the head with osseous protuberances and ridges. Pectoral spine with recurved serræ on both margins, largest near the tip. Barbels 6, the maxillary barbels not extending beyond middle of pectoral. Eye minute.

Habitat: Amazon from Serpa to the mountains of Ecuador and Peru; Demarara.

ANALYSIS OF THE SPECIES OF BUNOCEPHALUS.

a. A. 6.
  b. Distance of dorsal from tip of snout 2-2½ in the length.
    c. Head high, its depth at occiput equal to the distance between tip of snout and base of pectoral; nuchal plate narrow with two high knobs; bony protuberances of the head greatly developed; coracoid processes converging backward. *scabriceps* 2.
    cc. Head depressed, its depth about 1½ in the distance between tip of snout and base of pectoral; nuchal plate broad, its width 3½ in its length; coracoid processes parallel. *verrucosus* 3.

bb. Distance of dorsal from tip of snout 2⅓ in the length. Brownish, clouded and spotted with darker. *gronovii* 4.

aa. A. 7–8.

d. Length of coracoid processes 1 in the distance between their bases; depth at occiput 2 in the distance between tip of snout and base of pectoral; nuchal plate a thin low crest. *bicolor* 5.

dd. Length of coracoid processes 1½ in the distance between their bases; head without prominent ridges or marginal angles; maxillary barbel to second third of pectoral spine. Black, darkest on the sides; head speckled with paler. (Cope.) *melas* 6.

ddd. Length of coracoid processes 2 in the distance between their bases; ridges of the head reduced to a minimum; depth at occiput 1½ in the distance between tip of snout and base of pectoral. *knerii* 7.

aaa. A. 9; D. 5–6. First dorsal ray nearer tip of snout than to base of caudal; maxillary barbel reaching to middle of pectoral spine. Brown, head dotted with white above; sides and back with dark brown blotches. Dorsal, tips of anal and caudal blackish. (Cope.) *aleuropsis* 8.

2. Bunocephalus scabriceps.

Bunocephalus scabriceps E. & E. Proc. Cal. Acad. Sci., 2d Ser. ii, 1889, 49. (Jutahy.)

This species is distinguished by the extreme development of the knobs on the head. It is known from the types only.

Tail slender, tapering. Head and body deep, the depth at base of occipital process scarcely less than the distance from tip of snout to base of pectoral fins.

Nuchal plate a thin crest with two high knobs, and a knob at its base; a transverse crest at base of nuchal plate directed backward externally; a low crest between the eyes, two crests extending backward becoming approximated behind, forming a lyre-shaped figure; each side of the lyriform crest provided with three knobs; a crest extending from the eye forward and meeting its fellow at the tip of the snout.

Interorbital width equals the snout plus the eye. Eye almost lateral.

Maxillary barbels reaching about to base of pectoral fins; mental barbels not reaching postmentals, postmentals less than interorbital width.

Teeth villiform, in two narrow patches in each jaw.

Coracoid processes converging backward, the margins of the coracoid bone marked by prominent ridges, which with the processes form a lyriform figure; the length of the processes about equal to the space between them. Humeral process extending to about the middle of the pectoral spine.

Pectoral pore large, slit-like.

Skin everywhere covered with small warts.

Distance of dorsal fin from tip of snout 2⅛ in the length.

Pectoral spine reaching to tip of coracoid process, both margins with strong hooks, strongest toward tip.

Back mottled with light and dark brown; belly more uniform brown; all the fins dark brown marked with lighter.

A. 6. Greatest width in front of the pectoral 3 in the length.

Two specimens .04–.043 m. Jutahy. James, Thayer & Talisman.

3. Bunocephalus verrucosus.

Platystacus verrucosus Bloch, xi, 63, pl. 373, fig. 3.
Silurus verrucosus Bloch & Schneider, 379, 1801.
Aspredo verrucosus Cuv. & Val. xv, 442, 1840 (copied).
Bunocephalus verrucosus Günther, Catal. v, 266, 1864 (copied). E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 48. (Serpa.)
Habitat: Amazon, below the Madeira.

Tail 4-angled, deeper than wide; body not greatly depressed; depth of head at base of occiput somewhat less than 1½ in the space between tip of snout and base of pectoral. Nuchal plate rather broad, its width at base about 3½ in its length, a transverse ridge at its base turning abruptly backward and upward exteriorly; another transverse ridge in front of this and connected with the first described by a median ridge, a continuation of the nuchal plate.

Interorbital width greater than length of snout.

Maxillary barbels reaching somewhat beyond origin of pectoral fins; mental barbels about reaching to the postmentals, postmentals about as long as the width of interorbital.

Teeth in two patches in each jaw.

Coracoid processes parallel, as long as the distance between them. Humeral process reaching to middle of pectoral spine.

A slit-like pectoral pore.

Skin everywhere covered with warts.

Distance of dorsal fin from tip of snout 2½ in the length.

Pectoral spine slightly curved, reaching beyond tip of coracoid process, its margins with recurved hooks which are largest toward the tip.

Dark brown, dotted and spotted with lighter and darker; belly somewhat lighter, with rather large dark brown spots, all the fins dark brown, the rays with small transparent spots, the tips of dorsal, anal and ventrals transparent.

A. 6.

One specimen .11m. Serpa. S. V. R. Thayer.

4. Bunocephalus gronovii.

Aspredo verrucosa Gronow, Syst. Ichthyol., 137, 1854 (not of Bloch).

Bunocephalus verrucosus Kner. SB. Ak. Wien, xviii, 1855, 96. (Barra do Rio Negro).

Bunocephalus gronovii Bleeker, Ichthyol. Arch. Ind. Siluri, 329, 1858. Günther, Cat. Fish. Brit. Mus. v. 266, 1864 (Demerara). E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 48.

Habitat: Mouth of Rio Negro and Demarara.

5. Bunocephalus bicolor.

Bunocephalus bicolor Steindachner, Flussf. Südam. iv, 8, pl. ii, fig. 1, 1882, (Rio Huallaga). E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 48 (Cudajas; Jutahy).

Habitat: Amazon and its tributaries from Cudajas to Huallaga.

Dr. Steindachner says in the description that this species has eight anal rays; the figure shows only five.

Tail long and slender. Head and body greatly depressed, the depth at the occiput 2 in the distance from the tip of snout to base of pectoral. Nuchal plate a thin, low crest; crests and ridges of the head low, not prominent. Greatest width in front of the pectorals little more than 3 in the length. Profile somewhat depressed behind the eyes.

Interorbital width equals the snout plus the eye.

Maxillary barbels reaching about to base of pectorals, mental to the postmental barbels which equal the interorbital.

Teeth small, villiform, in two patches in each jaw.

Coracoid processes converging slightly, at least as long as the distance between their bases.

Pectoral pore present.

Upper surface of the head comparatively smooth; snout, lower surface and the tail thickly covered with warts.

Distance of dorsal fin from tip of snout 2¼ in the length.

Pectoral spine reaching the ventral fins, its margins with recurved hooks.

The larger specimen is dark grayish-brown; the smaller light brown, the markings similar in both; top of head and nape light, spotted with dark; tail darker, three light areas on its dorsal surface; belly spotted with lighter; fins dark brown, the tips of the rays light.

A. 7–8.

Two specimens .05–.073 m. Cudajas; Jutahy. Thayer Expedition.

6. Bunocephalus melas.

Bunocephalus melas Cope, Proc. Acad. Nat. Sci. Philad. 1874, 132 (Nauta); id., Proc. Am. Phil. Soc. 17, 1878, 681 (Nauta); E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 48.

Habitat: Peruvian Amazon.

This species is known only from the types.

7. Bunocephalus knerii.

Bunocephalus knerii Steindachner, Flussf. Südam. iv, 9, pl. ii, fig. 2, 1882 (Canelos); Boulanger, Proc. Zool. Soc. Lond. 1887, 278 (Canelos); E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 48 (Cudajas; Tabatinga; Hyavary).

Habitat: Amazons and tributaries from Cudajas westward to the Andes of Peru and Ecuador.

Tail slender, terete. Depth at the occiput 1½ in the space between tip of snout and base of pectoral.

Nuchal plate a thin, low crest; ridges of the head less prominent than in any other species.

Interorbital equals the snout plus the orbit.

Maxillary barbel reaches base of pectoral; mental barbel scarcely longer than the eye, postmental about twice as long.

Coracoid processes very short, equal to about half the distance between them.

Skin everywhere covered with warts, the lower surface of the head least so.

Distance of dorsal fin from tip of snout 2½ in the length.

Tip of pectoral spine midway between tip of coracoid process and origin of ventral fin.

Sides dark gray with a series of light spots; head lighter marked with blackish; about three dark gray cross bands across the back; caudal blackish, mottled and margined with light; other fins light, dotted or blotched with gray.

A. 7–8.

Eight specimens .035 m. Cudajas; Tabatinga; Hyavary. Thayer Expedition.

8. Bunocephalus aleuropsis.

Bunocephalus aleuropsis Cope, Proc. Am. Philos. Soc. 1870, 568 (Pebas, Ecuador); E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 48.

Habitat: Ecuador.

This species is known only from the type.

III. DYSICHTHYS.

Dysichthys Cope, Proc. Acad. Nat. Sci. Philad. 1874, 133 *(coracoideus).*

Type: *Dysichthys coracoideus* Cope.

This genus is said to differ from *Bunocephalus* in possessing maxillary barbels only.

9. Dysichthys coracoideus.

Dysichthys coracoideus Cope, l. c.; id. Proc. Am. Philos. Soc. 17, 1878, 681 (Nauta); E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 50 (name only.)

Habitat: Nautâ.

Dorsal fin adnate, its first ray little nearer tip of snout than to base of caudal. Nuchal shield with strong ridges and scalloped borders; length of coracoid processes equal to the distance between them; pectoral spine extending beyond base of ventrals; maxillary barbels to base of pectorals. Belly, tail and fins black; throat and belly white speckled. Shield brown, with paler specks. D. 5; A. 7. (Cope.)

SUBFAMILY PLATYSTACINÆ.

IV. PLATYSTACUS.

Aspredo Linnæus, "Mus. Ad. Fred. 73."

>*Aspredo* Bleeker, Nederl. Tijdschr. Dierk. i, 1863, 117 (*batrachus*=*aspredo*).

Platystacus Bloch, Ausl. Fische, viii, 1794 (sp.)

>*Platystacus* Bleeker, l. c., 118 (*cotylephorus*).

>*Cotylephorus* Swainson, Fish, Amph. & Rept. ii, 308 1839 (*blochii*=*cotylephorus*).

>*Aspredinichthys* Bleeker, l. c. 118 (*tibicen*).

Type: *Silurus aspredo* Linnæus.

The name *Aspredo*, according to the generally adopted rules of nomenclature, is not available for this genus. It was proposed before 1758, but not adopted in the Xth edition of the Systema Naturæ; the name *Platystacus*, being the oldest name adopted during the binomial era, must be substituted.

This genus is characterized by the increased number of caudal vertebræ. The anal is very long, being almost co-extensive with the tail. Barbels 6, short. The belly of the females, during the breeding season, is covered with short tentacles, to which the eggs are attached. The pectoral spine is broad, depressed; its inner margin with introrse teeth which are strongest at the tip; its outer margin with shorter extrorse teeth.

Habitat: Guiana; Rio Para and Rio Muria.

ANALYSIS OF THE SPECIES OF PLATYSTACUS.

a. Tip of snout smooth.
  b. Sternal and abdominal region without tentacles.
    c. Barbels 6, there being no barbel at the base of the maxillary. (PLATYSTACUS.)
      d. First dorsal ray not or scarcely produced. Head to gill opening, 9 in the length, with the caudal. *cotylephorus* 10.
      dd. First dorsal ray produced. Head to gill opening, 10 in the length, with the caudal. *nematophorus* 11.
    cc. Barbels 8, there being a small one on the anterior margin of the maxillary bone; snout broad, greatly depressed, spatulate. (ASPREDO.)
      e. Head to tip of nuchal plate more than 4 in the length to base of caudal. *aspredo* 12.
      ee. Head to tip of nuchal plate less than 4 in the length with the caudal; barbels longer than in *aspredo*. Brownish above, with white dots; anal with a black margin. (Cuv. & Val.) *sicuephorus* 13.
  bb. Sternal and abdominal region with a marginal series of tentacles. Barbels 8, there being a minute one on the anterior margin of the maxillary bone; snout rather pointed; first dorsal ray produced in a very long filament; posterior anal rays and caudal black. *filamentosus* 14.
aa. Tip of snout with four broad spines, the inner ones fixed, belonging to the ethmoid, the outer movable, belonging to the nasals. (ASPREDINICHTHYS.) *tibicen* 15.

10. Platystacus cotylephorus.

Platystacus cotylephorus Bloch, Ausl. Fische, viii, 54, pl. 372, 1794; Bloch & Schneider, Syst. Ichthyol. 372, 1801; Bleeker, Silures de Suriname, 95, 1864 (Surinam); E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 50 (Vigia; Para; Tajapuru).

Silurus cotylephorus Lacépède, Syst. Ichthyol. v, 78, 1803.

Aspredo cotylopherus Günther, Cat. Fish. Brit. Mus. v, 269, 1864, (Surinam).

Silurus hexadactylus Lacépède l. c. 82.

Aspredo sex-cirrhis Cuv. & Val., Hist. Nat. Poiss. xv, 441, 1840 (Surinam); Kner, SB. Ak. Wien, xvii, 1855, 93 (Surinam).

Aspredo spectrum Gronow, "Syst. Ichthyol. 137, 1854."

Habitat: Surinam and Rio Para.

Head greatly depressed, narrowed forward; interorbital width 3½ in the distance from base of pectoral to tip of snout; width of mouth equals the interorbital plus the orbits, the snout projecting half its length. Intermaxillaries with 2 rhomboidal patches of villiform teeth, lower jaw with wider patches of similar teeth.

Maxillary barbels reaching to gill-opening, mental not to postmental barbels which are as long as width of mouth.

Coracoid processes slightly diverging backward, the length of the processes 1¼ in the distance between their bases. Humeral processes co-extensive with but not overlapping the coracoid processes.

Pectoral pore below the tip of humeral process.

Distance of dorsal fin from tip of snout 3½–3⅜ in the length; first dorsal ray scarcely prolonged.

Outermost caudal rays prolonged. Four rows of papillæ on the sides.

Color uniform dark brown in some specimens, profusely mottled with lighter in others; one example is abruptly lighter behind the dorsal fin, another has the dorsal surface of head and nape to the dorsal fin plain light, with marblings of light on the brown ground posteriorly; fins uniform brown, or mottled like the body or the anal, sometimes white anteriorly.

A. 53–57; greatest width, before pectoral spine, 5½; length of head to gill opening 9 in the length, with the caudal fin.

Nine specimens .14–.33 m. Vigia; Para; Tajapuru. Thayer Exped.

11. Platystacus nematophorus.

Platystacus nematophorus Bleeker, Silures de Suriname, 96, pl. i, fig. 1, 1864 (Surinam); E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 50.

Aspredo nematophorus Günther, Cat. Fish. Brit. Mus. v, 270, 1864 (copied).

Habitat: Surinam.

12. Platystacus aspredo.

Silurus aspredo Linnæus, Syst. Nat. Ed. x, 304, 1758; Ed xii, 502, 1766; Bonnaterre, Tableau Encycl. Ichthyol. 150, 1788; Lacépède Syst. Ichthyol. v, 78, 1803.

Platystacus aspredo E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 50 (Para; Arary).

Platystacus lævis Bloch, Ausl. Fische viii, 58, 1794; Bloch & Schneider, Syst. Ichthyol. 373, 1801.

Aspredo lævis Cuv. & Val. Hist. Nat. Poiss. xv, 431, 1840 (Guiana); Müller & Troschel, Schomburgk's Brit. Guiana, 630, 1848 (Waini).

Aspredo batrachus (Linnæus Mus. Ad. Fred. 73) Gronow, "Cat. Fish." 137, 1854; Bleeker, Silures de Suriname, 93, 1864 (Surinam); Günther, Cat. Fish. Brit. Mus. v, 269, 1864 (British Guiana; Cayenne; Surinam).

Habitat: Guiana; Rio Para and Lake Arary.

Head greatly depressed, spatulate; interorbital width 3½ in the distance from base of pectoral to tip of snout. Mouth broad, the snout projecting almost its entire length; each jaw with two patches of small teeth. Maxillary barbel reaching to base of pectoral, an accessory barbel in front; mental barbels placed near the lip, extending to the postmental, which is equal to the interorbital.

Coracoid processes slightly diverging backward, the length equal to the space between them.

A minute pectoral pore at the extremity of the coracoid process. Humeral process a little longer than the coracoid process and overlapping it.

Distance of dorsal fin from tip of snout 3⅘ in the length; first ray rarely prolonged. Outermost caudal rays slightly produced. Pectoral spine as in *A. tibicen*.

Dorsal surface uniform purplish brown, the ventral surface plain light shading into light purple or pinkish; dorsal fin dusky, usually with a dusky median stripe on the interradial membrane; caudal dark except the outermost rays; pectoral smutty, ventrals usually white, the posterior half sometimes dusky; anal fin white anteriorly becoming dusky backward; maxillary barbels more or less dusky.

Greatest width, before pectoral fins, 5⅔–6 in the length; A. 51–55.

Twelve specimens .14–.19 m. Para; Arary. Agassiz & Bourget.

13. Platystacus sicuephorus.

Aspredo sicuephorus Cuv. & Val. Hist. Nat. Poiss. xv, 439, 1840 (Mana).

Aspredo sicyephorus Günther, Cat. Fish. Brit. Mus. v, 269, 1864 (copied).

Platystacus sicuephorus E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 50.

Habitat: French Guiana.

14. Platystacus filamentosus.

Aspredo filamentosus Cuv. & Val. Hist. Nat. Poiss. xv, 437, pl. 450, 1840 (Cayenne); Günther, Cat. Fish. Brit. Mus. v, 270, 1864 (*Demarara*).

Platystacus filamentosus E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 50.

Habitat: Guianas.

15. Platystacus tibicen.

Aspredo tibicen (Temmink) Cuv. & Val. xv, 438, 1840 (Surinam); Günther, Catal. v, 270, 1864 (Brit. Guiana).

Platystacus tibicen E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 50 (Curuca; Rio Muria).

Habitat: Guiana; Curuca, Rio Muria.

This species may readily be distinguished by the nasal spines.

Head somewhat elongate, subconical. Interorbital width 5 in the distance between base of pectoral and tip of snout. Mouth narrow, the snout little projecting; teeth fine and long, the intermaxillary band continuous. Maxillary barbel about reaching to gill-opening, an accessory barbel on anterior margin of its bony base. Lower surface of the head with four irregular series of cirri, the outer series continued backward to behind the pectoral.

Coracoid processes diverging backward, their length about 1⅓–1½ in the distance between them at base. Humeral process co-extensive with the coracoid process, the pectoral pore almost immediately below its termination.

Distance of dorsal fin from tip of snout about 4 in the length; first dorsal ray greatly prolonged, filiform, somewhat longer than its distance from tip of snout. Outer caudal rays slightly produced.

Pectoral spine flattened, curved upward and backward, its posterior margin with a series of spines which are longer and stronger toward the tip, its anterior with somewhat weaker teeth, its tip reaching beyond origin of ventral fins.

Dorsal surface chocolate colored, a series of squarish darker spots on either side of the dorsal fold which are more or less confluent; ventral surface plain, nearly white; dorsal, pectoral, caudal and posterior portion of anal dark brown; ventrals and anterior part of anal light, the upper surface of ventrals dotted with dusky.

Greatest width, before pectoral fins, about 7 in the length; A. 57.

Five specimens .20–.22 m. Curuca, Rio Muria. Thayer Expedition.

FAMILY II. DIPLOMYSTIDÆ.

= *Diplomystidæ* Eigenm. Zoe, vol. i, 14, 1890.

This differs from the remaining families in possessing dentiferous maxillaries.

V. DIPLOMYSTES.

Diplomyste Dumeril, "Ichthyol. Analyt., 487."

Diplomystes Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 92 *(papillosus)*.

Diplomystax Günther, Cat. Fish. Brit. Mus., v, 180, 1864 *(papillosus)*.

The distinctive character of this genus is the development of the maxillary bone. It forms the sides of the mouth and carries a very narrow band of teeth. No mental barbels; maxillary barbels thick, compressed at the base. Occipital process not visible externally; no bony orbit. Skull with two nearly parallel median ridges above. Fontanel extending to the base of the occipital process, with a rather broad interruption behind the eyes.

Habitat: Chile, near Valparaiso and Santiago.

16. Diplomystes papillosus.

Molina "Hist. Nat. Chile, 199, No. 9."

?? *Silurus chilensis* Linnæus Syst. Nat. Ed. xiii, 1359, 1788 (Chile).

?? *Pimelodus chilensis* Lacépède Hist. Nat. Poiss. v, 114, 1803 (Fresh waters of Chile).

Arius papillosus Cuv. & Val. Hist. Nat. Poiss. xv, 118, pl. 431, 1840 (Valparaiso; San Jago); Gay, Hist. Chile, ii, 305, pl.: fig. 1, 1848 (Chile); Philippi, MB. Ak. Wiss. Berlin, 1866, 710 (Chile).

Diplomystax papillosus Günther, Cat. Fish. Brit. Mus. v, 180, 1864 (Chile).

Diplomystes papillosus Eigenm. & Eigenm. Proc. Calif. Acad. 2d Ser. vol. i, 1888, 149 (Rivers of Santiago).

Arius carcharias "Leybold, Anales de la Universidad de Chile, 1883 (Chile)"; Philippi, MB. Ak. Wiss. Berlin, 1866, 711 (Chile).

Arius villosus Philippi, l. c. 712 (Santiago).

Arius squalus Philippi, l. c. 713 (Santiago).

Arius micropterus Philippi, l. c. 713 (Santiago).

Arius synodon Philippi, l. c. 713 (Santiago).

Habitat: Central portion of Chile.

The numerous species of Philippi seem to be based on individual differences. The seventh dorsal ray is always divided to near its base, and in one of the specimens examined by us there are eight dorsal rays.

Slender, terete forward, compressed toward the tail; the width, below the dorsal spine, equals the depth. Head short and blunt, somewhat pointed in young, the profile strongly decurved in front; head entirely covered with a layer of muscle and skin, the surface of the bones irregular, rugose, the interorbital portion flattish, postorbital portion with two nearly parallel median ridges. Fontanel between the two median ridges, extending from the occipital process to in front of the eyes, with a broad bridge behind the eyes. Occipital process a deep but short crest.

Eye small, circular, 3 in snout, little more than 1 in the interorbital, 3 in the interocular, 7½ in the head.

Nostrils close together, with a membrane around the entire margin forming an 8-shaped figure, the portion of the membrane separating the nasal openings highest.

Maxillary barbel broad and flattened at its base, scarcely reaching the base of the pectoral.

Snout sometimes long and pointed, usually rounded, projecting considerably beyond the lower jaw. Lips thick and strongly papillose. Maxillary bones reaching to below the eye, 2⅔ in head. The anterior half of the maxillary consists of a slender peduncle bearing two series of teeth; the posterior portion is flattened and about three times as wide as the anterior portion. Intermaxillaries with a crescent shaped patch of teeth, the outer four or five series compressed, incisor-like, teeth of the inner series very much smaller, not incisor-like. Vomer with two oval patches of large, conical teeth, the patches becoming united with age. Teeth of the lower jaw compressed, incisor-like, the band deep in front tapering rapidly to the rictus.

Gill membranes usually separate to below the eye, entirely free from the isthmus. Gill-rakers 5+8. Pseudobranchiæ well developed, not covered by a membrane.

Skin covered with minute cirri or papillæ, which are especially conspicuous over the humeral region and head, the tail sometimes smooth.

Distance of dorsal fin from tip of snout 2⅗–2⅘ in the length, the spine stout and smooth, 1½–1⅔ in head. Distance of the adipose fin behind the dorsal about equal to the length of the adipose fin or one-half longer, 5–6 in the length.

Caudal emarginate with numerous, short, accessory basal rays.

Free margin of the anal straight or slightly convex, the fifth ray highest, about 1½ in the head, rapidly decreasing to the last ray, which is about half the height of the fifth.

Ventrals inserted under the last dorsal ray 1⅔–2 in the head.

Pectoral spine very strong and with a leathery prolongation; height of the spinous portion 1⅔–2 in the head; outer margin of the spine smooth, inner margin with strong recurved teeth along its entire length.

Bases of all the fins, lower part of head, suborbital region and opercles and a median line on the back purplish; rest of body and fins yellowish, and under the lens dark.

Head 4–4½; depth 4¼–5½; Br. 7; D. I, 7 or 8; A. 9–12.

Eight specimens .12–.20 m. Rivers of Santiago.

FAMILY III. SILURIDÆ.

<*Siluroides* Cuvier, Règne Animal, iii, 199, 1817.

<*Siluroidei* Bleeker, Nederl. Tijdschr. Dierk. i, 1863.

<*Siluridæ* Günther, Cat. Fish. Brit. Mus. v, 1, 1864.

>*Siluridæ* Gill, Arrangement of Families of Fishes, 19, 1872.

<*Siluridæ* Eigenm. & Eigenm. Am. Nat. July, 1888.

This, the largest family of the Nematognathi, is most widely distributed, having representatives in all the continents but Australia. It reaches its greatest development in the tropics of America.

The position and size of the dorsal, the free air bladder, the alimentary tract and opercle serve to separate this family from the other Nematognathi.

SUBFAMILY TACHISURINÆ.

ANALYSIS OF THE AMERICAN GENERA AND SUBGENERA OF TACHISURINÆ.

a. **Mental barbels none. Head greatly depressed, keeled behind. Occipital process becoming narrower behind, meeting the dorsal spine.**
PARADIPLOMYSTES VI.

aa. **Mental barbels two. Maxillary barbel broad, band-like. Pectoral spine and usually the dorsal spine with long band-like filaments.**
AILURICHTHYS VII.

aaa. **Mental barbels four. Maxillary barbels usually short, not band-like. Head not greatly depressed.**

  b. **Palatine teeth in numerous small patches which are aggregated on two fleshy cushions, one on either side of the arched palate. Mandibulary teeth disappearing with age. Intermaxillary band of teeth with backward projecting angles of separate patches of teeth.**
  GENIDENS VIII.

  bb. **Palatine teeth fixed; both jaws with teeth. TACHISURUS IX.**

    A. **Head and occipital process entirely covered with skin and muscle; occipital process sparingly granulated.** **(*Galeicthys*.)**

    AA. **Occipital process and bones of the head usually exposed, skin thin; crown of head and occipital process granular.**

      C. **Palatine patches of teeth with a backward projecting angle on the inner margin.**

        D. **Dorsal plate enlarged.** **(*Sciadeichthys*.)**

        DD. **Dorsal plate crescent shaped, not enlarged.**

          E. **Occipital process narrowed or constricted at base.** **(*Notarius*.)**

          EE. **Occipital process widest at base.** **(*Netuma*.)**

      CC. **Palatine patches of teeth without a backward projecting angle on the inner margin.**

          F. **Eye above the level of the mouth; gill rakers 25 or fewer.**

            G. **Teeth on the palate villiform.** **(*Hexanematichthys*.)**

            GG. **Teeth on the palate granular; no teeth on vomer. Gill membrane not forming a free margin across the isthmus.** **(*Tachisurus*.)**

          FF. **Eye not above the level of the mouth; gill rakers long and slender, 40 or more.** **(*Cathorops*.)**

VI. PARADIPLOMYSTES.

Paradiplomystes Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 92 (*coruscans*).

Paradiplomystax Günther, Cat. Fishes Brit. Mus. v, 180, 1864 (*coruscans*).

Maxillary barbels only, flat. Occipital process keeled, narrowed posteriorly and joined to the dorsal plate.

17. Paradiplomystes coruscans.

Pimelodes coruscans Lichtenstein, Wiedem. Zool. Mag. i, part 3, 58 (Brazil).

Paradiplomystes coruscans Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 92 (name only).

Paradiplomystax coruscans Günther, Cat. Fish. Brit. Mus. v, 180, 1864 (copied).

Barbels reaching to the middle of the body. Caudal forked; adipose oval. Upper lip projecting, jaws and palate with villiform teeth; eyes over the angle of the mouth. Br. 7; D. 8; A. 13. (Lichtenstein.)

This species is known from a single specimen .075 m. long in the Museum of the Berlin University; its exact locality is not known.

VII. AILURICHTHYS.

Ailurichthys Baird and Girard, Proc. Acad. Nat. Sci. Phila. 1854, 26 (*marinus*).

Ælurichthys Gill, Proc. Acad. Nat. Sci. Phila. 1863, 172.

Pimelodus Bleeker, Silures de Suriname 65, 1864 (*bagre*).

Type: *Silurus marinus* Mitchil.

Barbels four, maxillary barbels broad, band-like. Pectoral spines, and usually the dorsal spine, with a long band-like filament. Anal fin emarginate; caudal fin deeply forked. Vomer and palatine teeth forming a more or less crescentiform band.

This genus is composed of four species, two of which are found on the west coast of Panama and two on the east coast of tropical America.

ANALYSIS OF THE SPECIES OF AILURICHTHYS.

a. Dorsal spine not produced in a long filament; occipital process large, shaped like a clover leaflet; gill-rakers 5 + 14; base of ventrals about equidistant from snout and caudal. *panamensis* 18.

aa. Dorsal spine produced in a long filament; occipital process normal; gill-rakers not more than 9.

b. Distance of dorsal fin from tip of snout 3⅕–4 in the length; distance of adipose from the dorsal fin 2⅗ times in the length, or longer; base of anal 4⅘ in the length, or longer.

c. Anterior lobe of anal with minute dots; highest anal ray less than half the length of the base of the anal; vomerine and palatine patches of teeth separate; anal rays 32–35. *bagre* 19.

cc. Anterior lobe of anal with a large dark blotch; highest anal ray more than half the length of the anal's base; vomerine and palatine patches of teeth joined; anal rays 28–30. *pinnimaculatus* 20.

bb. Distance of dorsal from tip of snout 3 in the length; distance of adipose from dorsal fin 3 in the length; highest anal ray about as high as the base of the anal, which is 5⅕–6½ in the length; anal rays 20–24. *marinus* 21.

18. Ailurichthys panamensis.

Ælurichthys panamensis Gill, Proc. Acad. Nat. Sci. Philad. 1863, 172 (West Coast Central America); Günther, Fish. Centr. Am. 393 & 476, 1866 (Panama); Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthol. Beitr. iv, 14, plate ii, fig. 1-4 (Altata, Panama, Magdelena Bay); Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 37 (Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 622 (Panama); Jordan, Proc. U. S. Nat. Mus. 1885, 365 (name only); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 148 (Panama).

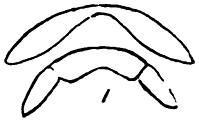
Ælurichthys nuchalis Günther, Cat. Fish. Brit. Mus. v, 179, 1864 (Pacific Coast 'Panama); Günther, Fish. Cent. America, 393 & 476, plate lxxxi, fig. 2 (Panama).

Habitat: West coast of Central America and Mexico.

Body rather robust, the depth under the dorsal spine scarcely greater than the width. Head short, its depth at the base of the occipital process equal to its greatest width, 1⅓ in head. Fontanel narrow, prolonged as a groove to the base of the occipital process which is variable in form, in the male like a clover leaflet, as broad as long, obtusely keeled. Profile steep.

Eye large, 1½ in snout, 1½ in the interorbital, 3–4 in the interocular, 4¼–5¼ in the head.

Maxillary barbels reaching to the base of the ventrals or somewhat shorter; mental barbels reaching little beyond the gill-membrane, or considerably shorter. Jaws subequal, the upper slightly longer, margin of the upper jaw semicircular; teeth on the inter maxillary in two lanceolate patches; vomer with an elliptical band constricted in the middle; palatine teeth in much narrower patches, contiguous to the vomerine patches.



Gill-membranes joined, free from the isthmus. Gill-rakers long and slender, equal to half the diameter of the eye, 5–6+12–14.

Distance of dorsal fin from tip of snout 2⅘–3 in the length; the spine not produced in a filament beyond the following rays, the spinous portion 1⅗ in head, its outer margin roughened; greatest height of the fin 1⅖ in the length of the head. Adipose fin very short, higher than long; its distance from the dorsal 2⅗–2⅔ in the length.

Caudal deeply forked, 3¼–3⅗ in the length.

Highest anal ray 1½–2⅓ in the head.

Ventrals inserted under the vertical at a point posterior to the dorsal, longer than the length of the dorsal fin, their tips sometimes reaching the anal, 1½–1⅝ in length of head.

Pectoral spine prolonged in a filament which reaches to the anal fin, sometimes shorter; both margins roughened, the length of the spinous portion 1⅓–1½ in the head.

Steel-blue above with brassy or golden reflections; lower parts silvery; fins with dark points; lower part of sides with similar points.

Head 3⅔–4¼; depth 4⅔–5½; D. I, 7; A. 28–30.

Four specimens .26–.37 m. Panama.

One specimen is deformed, having the head greatly arched, the lower jaw projecting. The label attached reads: . "Specimen from whose mouth two parasitic crustaceans were taken."

19. Ailurichthys bagre.

Silurus bagre Linnæus, Syst. Nat. Ed. xii, 505, 1766; id. Ed. xiii, 1360, 1788; Bloch, Ausl. Fische, 8, 27, pl. 365, 1794 (America); Gmelin, Linnæus, Syst. Nat. 270, 1818;(Brazil and North America).

Pimelodus bagre Lacépède, Hist. Nat. Poiss. v, 93, 98, 1803 (Brazil); Bleeker, Silures de Suriname, 66, 1864 (Surinam).

Ælurichthys bagre Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Ailurichthys bagre Eigenm. & Eigenm, Proc. Cal. Acad. Sci., 2d. Ser. i, 1888, 148 (Sao Matheos; Santos; Para; Curuca; Bahia; Pernambuco; Brit. Guiana).

Galeichthys gronovii Cuv. & Val. Hist. Nat. Poiss. xv, 40, 1840 (Guiana; Maracaibo; Maua; Cayenne; Bahia); Müller & Troschel, Schomburgk, Brit. Guiana, 628; Kner, SB. Ak. Wien, xxvi, 1857, 392 (Cajutuba, Para).

Ælurichthys gronovii Günther, Cat. Fish. Brit. Mus. v, 178, 1864 (Demerara, West Indies).

Felichthys filamentosus Swainson, Fish. Rept. & Amph. ii, 309, 1839 (based on Bloch pl. 365).

Galeichthys eidouxii Cuv. & Val. Hist. Nat. Poiss. xv, 43, 1840 (Guayaquil).

Æilurichthys eydouxii Jordan, Proc. U. S. Nat Mus. 1884, 40 (note on type).

Bagrus macronemus Ranzani, "Nov. Comm. Acad. Sci. Inst. Bonon, 1842, v, 334, plate 28."

Mystus carolinensis Gronow, "Syst. ed. Gray, 156, 1854."

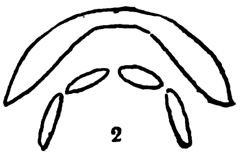
Pimelodus longifilis Mus. L. B. (fide Bleeker).

Habitat: West Indies, south to Santos below Rio Janeiro.

Compressed elongate; greatest width less than the greatest depth. Head depressed, short, its greatest width 1¼ in its length, the depth at the occipital process 1⅓–1½ in the length of the head; the profile very steep. Occipital process much broader at base than at apex, which is notched, articulating with the dorsal plate. Interorbital flat, the fontanel not extending behind the eye, continued as a groove to the base of the occipital process. Entire upper and anterior portion of the head very porous.

Eye 1–1⅔ in snout, 1½–2 in the interorbital, 4½–6 in the head.

Maxillary barbels reaching to beyond origin of the anal; mental barbels reaching hardly to the gill-opening. Upper jaw slightly projecting, teeth all very fine, villiform; the intermaxillary band shallowest in the middle, becoming twice as deep on the sides, tapering to a fine point behind; teeth on the vomer in two separate elliptical patches; palatine teeth in a similar patch on either side, much longer than the vomerine patches.



Gill-membranes united and narrowly joined to the isthmus. Gill-rakers very slender, 2+6.

Distance of dorsal fin from tip of snout 3½ in the length, the spine granular toothed in front, 1¼–1½ in head, the filament reaching to the caudal, the ray following equal to the length of the head. Distance of the adipose behind the dorsal fin 2⅕–2½ in the length.

Caudal deeply forked, about 3½ in the length.

Base of anal 3¾–4¼ in the length, the highest ray 2⅓ in the base.

Base of ventrals about equidistant between snout and end of the anal fin, the ventral fin 1⅖–1⅗ in the head.

Pectoral spine 1⅙ in the head, the filament reaching beyond the origin of the anal.

Dark purplish above, gradually shading into silvery below, all the fins purplish, more or less thickly covered with black dots, their tips sometimes dark purple; sometimes the edge of belly and lower parts of sides with similar dots.

Head 4¾; depth 4¾–6; D. I, 7; A. 32–35.

The specimens examined are from Sao Matheos; Santos; Para; Curuca; Pernambuco; British Guiana; Bahia.

20. Ailurichthys pinnimaculatus.

Ælurichthys pinnimaculatus Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 15, plate viii, figs. 1–3 (Panama; Altata; West Coast of Costa Rica); Jordan & Gilbert, Bull. U. S. Fish Com. 1882, 34 (Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus, 1882, 622 (Panama); Jordan, Proc. U. S. Nat. Mus. 1885, 365 (Libertad; Punta Arenas).

Ailurichthys pinnimaculatus Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. Vol. i, 1888, 148 (Panama).

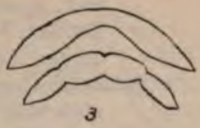
Habitat: West Coast of Central America and Panama.

Body somewhat elongate, its greatest depth equal to its greatest width, somewhat compressed posteriorly. Head short and depressed, its greatest depth at the base of the occipital crest equals ¾ of its greatest width which is equal to its length. Fontanel broad, continued as a groove to the base of the occipital process. Occipital process narrow, reaching to the dorsal plate.

Profile from dorsal spine to tip of snout concave.

Eye 1 in snout, 1¾ in interorbital, 4 in the interocular, 5½ in head.

Snout rather broad, sub-truncate, projecting slightly beyond the lower jaw. Intermaxillary band of teeth shallowest in the middle; vomerine teeth forming with the palatine teeth a narrow crescentiform band of about the same depth throughout. Teeth of the lower jaw in a shallow band which is interrupted at the symphysis and tapers to the rictus.



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Maxillary barbels broad band-like, reaching about to the middle of the anal fin.

Gill-membranes united, gill rakers 1 or 2+3 or 4.

Distance of dorsal spine from tip of snout 3⅓–3½ in the length. Dorsal spine 1⅓ in head, with a few notches on its outer margin near the tip, its filament reaching to the caudal.

Caudal deeply forked, the upper lobe 3 in the length.

Longest anal ray 1½ in head, shortest ray ¼ as long as the longest.

Pectoral spine depressed, $1\frac{1}{5}$ in the head, short tubercles on its outer edge; the pectoral filament reaches beyond the middle of the anal fin.

Metallic blue above, lower parts silvery. Anal with a large oval dusky area in front; lower caudal lobe lighter.

Head $4\frac{3}{5}$; depth $4\frac{4}{5}$; D. I, 7; A. 28–30.

Four specimens .28–.44 m. Panama. Dr. Johnes.

21. Ailurichthys marinus.

Silurus bagre Bloch, plate 365 (not L.); Bloch & Schneider, Syst. Ichthyol. 377, 1801.

Silurus marinus Mitchell, Trans. Lit. & Phil. Soc. N. Y. i, 433, 1814.

Galeichthys marinus DeKay, Fish. New York, 178, pl. 37, fig. 118, 1814 (New York).

Ailurichthys marinus Baird & Girard, Proc. Acad. Nat. Sci. Philad. 1854, 26; Girard, U. S. and Mexican Boundary Survey 31, pl. 14 (Indianola, Tex.); Eigenm. & Eigenm. Proc. Calif. Acad. Sci. 2d Ser. vol i, 1888, 148 (Rio de Janeiro; Para; Bay of Balaxy; Mobile Bay; Pernambuco; Victoria).

Ælurichthys marinus Günther, Cat. Fish. Brit. Mus. v, 178, 1864 (North America); Goode, Proc. U. S. Nat. Mus. 1879, 119 (St. Johns River, Florida); Steindachner Flussfische Südamerika's, i, 10, 1879 (Orinoco near Ciudad); Jordan and Gilbert, Proc. U. S. Nat. Mus. 1882, 246 (abundant from Pensacola, Florida, to Galveston, Texas); id. ib. 584 (Charleston, S. C.); Jordan, Proc. U. S. Nat. Mus. 1883, 106 (Key West, Florida); Jordan & Gilbert, Synopsis Fish. North America, 111, 1883 (Cape Cod to Mexico); Jordan, Cat. Fish. North America, 16, 1885 (name only); Jordan, Proc. U. S. Nat. Mus. 1886, 26 (Beaufort, N. C.)

Felichthys filamentosus Swainson, Fishes, ii, 305, 1837 (based on Bloch plate 365).

Pimelodus filamentosus Bleeker, Silures de Suriname 67, 1864 (Surinam).

Galeichthys parræ Cuv. & Val. Hist. Nat. Poiss. xv, 33, 1840 (New York; Charleston; New Orleans; Rio Janeiro); Castelnau, Anim. Amér. Sud, Poiss. 37, 1855 (Bahia); Hyrtle, Denk. Ak. Wien, xvi, 1859, 17 (vertebræ 13+7+30).

Galeichthys blochii Cuv. & Val. Hist. Nat. Poiss. xv, 44, 1840 (Bahia).

Galeichthys bahiensis Castelnau, Anim. Amér. Sud, 37, pl. xviii, fig. 1, 1855 (Bahia).

Ælurichthys longispinis Gunther, Cat. Fish. Brit. Mus. v, 178, 1864 (Mexico; South America); Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Habitat: East coast of America from Cape Cod to Rio de Janeiro.

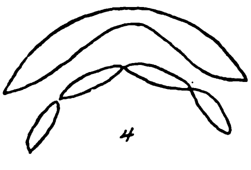
On account of the great variability of the palatine teeth and pectoral spine in the specimens examined we have placed *longispinis* in the synonymy of *marinus*.

Rather robust, with slender caudal peduncle; the greatest width less than the depth. Head short, its greatest width 1⅙–1¼ in its length, the depth at the occipital process about equal to the greatest width; profile not very steep. Occipital process broader at base articulating with the dorsal plate; occipital process granular, covered with thin skin, the post orbital portion of head sometimes granular; the fontanel not continued behind the eye except as a groove to the base of the occipital process; the head nowhere as porous as in *gronovii*.

Eye 1–1⅓ in snout, 2–2½ in interorbital, 4–5 in head.

Maxillary barbels extending to the vent in young, not to base of ventrals in adult specimens.

Upper jaw slightly longer; intermaxillary band of teeth as in *gronovii*; vomerine and palatine patches very variable, sometimes united, forming a single band, sometimes the patches of the vomer are united but separate from the palatine patches; again the vomerine patches are separate but joined to the palatine patches, and in some cases all the patches are separate giving four distinct patches on the roof of the mouth.



Gill-membranes united and narrowly joined to the isthmus. Gill-rakers 3+6.

Distance of dorsal fin from tip of snout 3 in the length, slightly less in the adult; the spine granular toothed in front, 1½–1¼ in head, the filament reaching scarcely to the adipose fin in the adult. Distance of the adipose behind the dorsal fin 3 in the length, in adult, 2¾ in young specimens.

Caudal deeply forked, 3–3¼ in the length.

Base of anal 5⅘–6½ in the length, the highest anal ray about equal to the length of the base.

Base of ventral nearer to base of caudal than to the snout, the rays sometimes reaching to origin of anal, 1⅓–1⅔ in head.

Pectoral spine 1¼–1 in head, the filament reaching to origin of anal, much shorter in the adult.

Bluish purple above, silvery below, lower portion of the side of the head and body thickly covered with brown dots; dorsal, inner surface of pectorals and ventrals and the anterior portion of the anal thickly covered with purplish dots.

Head 4–4¼; depth 4⅓–5⅓; D. I, 7; A. 20–24.

The specimens examined are from Rio de Janeiro; Para; Bay of Balaxy; Mobile Bay; Pernambuco; Victoria, Brazil.

VIII. GENIDENS.

Genidens Castlenau, Anim. Nouv. ou Rares Amér. Sud, Poiss. 33, 1855 (*cuvieri*=*genidens*).

Barbels six. Postorbital portion of the head granular, covered with very thin skin. Occipital process triangular, strongly keeled and articulating with the dorsal plate. Fontanel extending considerably beyond the eye and continued as a groove behind it. Palatine teeth in small patches which are aggregated in two oval patches on the sides of the palate; the patches of teeth resting on the thick fleshy cushion. Dorsal composed of a spine and seven rays. Caudal forked.

22. Genidens genidens.

Bagrus genidens Cuv. & Val. Hist. Nat. Poiss. xiv, 452, pl. 419, 1839 (Rio de Janeiro).

Genidens genidens Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. vol. i, 1888, 148 (Porto Alegre; Santos; Rio Janeiro; Rio Sao Matheos; Rio Grande do Sul).

Genidens cuvieri Castlenau, Anim. Nouv. ou Rares Amér. Sud, Poiss. 34, 1855 (La Plata and tributaries); Günther, Cat. Fish. Brit. Mus. v, 175, 1864 (Brazil); Kner, Novara Fisch. 312, pl. xii, figs. 3–3*a*, 1869 (Rio Janeiro); Hensel, Wiegm. Arch. 1870, i, 71 (Guahyba and tributaries); Steindachner, SB. Ak Wien, lxxiv, 1876. Süsswasserfische südöstlichen Brasiliens, iii, 89 (Guahyba; Rio Janeiro; Rio S. Matheos; Porto Seguro; Santos).

Genidens granulosus Castlenau, Anim. Nouv. ou Rares Amér. Sud, Poiss. 34, pl. xvi, fig. i, 1855 (Rio Araguay, Prov. of Goyaz, Brazil).

? *Laukidi* Schomburgk, Fish. Brit. Guiana, part i, 176, 1843 (in part).

Rhamdia laukidi Bleeker, Nederl. Tijdsch. Dierkunde, i, 208, 1863 (name only).

Habitat: Rio Plata and its tributaries north to the Araguay; ? British Guiana.

We have examined 33 specimens .11–.41 m. from Porto Alegre; Santos; Sambaia; Rio Janeiro; Rio Sao Matheos; Rio Grande do Sul. As in many cases, Schomburgk has described two fishes under his *Laukidi*. The color belongs to this species—everything else to some other fish; as the color comes first in the description, the name *laukidi* should stand a synonym of *genidens*.*

Width behind the head little greater than the depth. Transverse section of the postorbital portion of the head arched, the snout decurved, interorbital region flat. Occipital process strongly keeled, reaching the narrow, saddle-shaped dorsal plate; a groove from near the base of the occipital process forward to the fontanel. Fontanel consisting of three parts, the posterior a very small triangular opening, the middle one an elliptical opening 1½ diameters of the eye in length, the anterior one-half a diameter. Skin of the postorbital portion of the head very thin, the surface of the bones very strongly granulose, striate in the young. Snout and sides of the head with vermiculating mucous canals.

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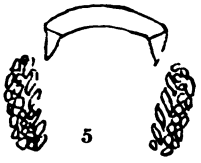
*Schomburgk says in his Fishes of British Guiana, part i, 82: "I had nothing to guide me in my researches. The scientific Ichthyologist may therefore be disappointed in my remarks." And on page 83: "The first specimen of any fish, a drawing of which we did not previously possess, served generally to sketch its outward form and general colours on the paper; and when we were fortunate enough to secure a second specimen, those delicate hues were painted in, which are only visible immediately after the fish comes out of water, and which so quickly vanish when life is extinct." It is to this last statement that we must attribute the fact that so many of Schomburgk's fishes are composites, the color belonging to one, the structure to another fish. Schomburgk's notes were edited by Jardin, who often referred the wrong drawing to the descriptions. That these facts are true may be seen from Richard Schomburgk's statement, Fauna and Flora Brit. Guiana, iii, 618. "Leider sind in Folge von Missgriffen, die ein anderer Verfasser nach den ihm vorliegenden Abbildungen und Bemerkungen machte, in Rücksicht der Gattungen eine Menge Irrthümer in diese Arbeit gekommen, wie auf der anderen Seite die dem Buche beigefügten Abbildungen nur in wenigen Fällen auf Treue Anspruch machen können."

Eye elliptical, its longitudinal axis inclined, the diameter 1–1½ in the snout, 4–5 in head, 1¼–1½ in the interorbital.

Lips thick, upper jaw projecting; depth of the intermaxillary band of teeth 6 in its width; a small subtriangular patch of teeth, similar to one of the small palatine patches, is contiguous to the intermaxillary band, and appears to form a backward projecting angle to it; palatine teeth in numerous small patches which are aggregated into a large patch on either side, and attached to a fleshy cushion, forming the sides of the strongly arched palate; mandibulary teeth larger than the intermaxillary teeth, in five or six irregular series, the depth of the band about equal to the intermaxillary band, broadly interrupted in front; the teeth disappearing with age.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Maxillary barbels reaching to the edge of the opercle, a little longer in the young; mental and postmental barbels inserted in a line parallel with the edge of the mandible, reaching scarcely beyond the branchiostegal membrane, or shorter.

Gill-membranes united and joined to the isthmus, leaving a narrow free margin. Gill-rakers 5+9.

Distance of dorsal spine from tip of snout 2⅗–2¾ in the length; dorsal spine stout, its inner margin with a few recurved teeth near the tip, outer margin with granules along its basal half, the upper half with recurved notches; the height of the spine 1⅓–1¾ in the length of the head; the highest ray 1–1⅔, the rays rapidly decreasing backward, the last being less than half the height of the first. Distance of adipose fin from the dorsal 3½–3⅕ in the length, the adipose fin very short, 1½ diameters of the eye in length.

Caudal deeply forked, the upper lobe narrower and longer, 3½–4⅕ in the length.

Free margin of the anal emarginate.

Ventrals 2–2⅓ in the head.

Pectorals 1¼–1⅔ in the head; pectoral spine stout, depressed, about as high as the dorsal spine; outer margin roughened, with recurved hooks near the tip becoming obsolete in the adult; inner margin with saw-teeth in small specimens, becoming more or less irregular in large examples.

Color blue-black; bluish silvery on sides below the lateral line, below smutty with dots, which, under the lens, are seen to be pale blue encircled with dark brown, the ventral surface sometimes plain whitish; the fins usually dark smutty.

Head 3⅖–4; depth 6; Br. 6; D. I, 7; A. 18–19.

IX. TACHISURUS.

Tachisurus Lacépède, Hist. Nat. Poiss. v, 151, pl. v, fig. 2, 1803.

Bagrus Cuv. & Val., Hist. Nat. Poiss., xiv, 1839 (sp.)

Galeichthys Cuv. & Val., l. c. xv, 28, 1840 (sp.)

Galeichthys Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 90 *(feliceps)*.

Arius Cuv. & Val., Hist. Nat. Poiss. xv, 52, 1840 (sp.)

Arius Bleeker, Ichthyol. Arch. Indici Siluri, 1858 *(arius)*.

Arius Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 91 *(grandicassis)*.

Sciades Müller & Troschel, Horae Ichthyol. iii, 8, 1849 (sp.)

Sciades Bleeker, l. c. *(emphysetus)* not *Sciades* Blkr., Ichthyol Arch. Indici Siluri, 62 *(pictus)*.

Ariodes Müller & Troschel, l. c. iii, 9, 1849 (sp.)

Ariodes Bleeker, Ichthyol. Arch. Indici Siluri, 62, 1858 *(arenarius)*.

Hexanematichthys id., l. c. 61 *(sundaicus)*.

Cephalocassis id., l. c. 62 *(melanochir)*.

Netuma id. l. c. *(nasuta)*.

Guiratinga id. l. c. *(commersonii)*.

Sciadeichthys id. l. c. *(emphysetus)* not *Sciadeichthys* Blkr., Nederl. Tijdschr. Dierkunde, i, 1863, 99 *(pictus)*=*Sciades*.

Selenaspis id. l. c. *(herzbergii)*.

Hemiarius Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 90 *(stormi)*.

Pseudarius id. l. c. 1863, 91 *(arius)*=*Arius* Blkr., 1858.

Leptarius Gill, Proc. Philad. Acad. Nat. Sci. 1863, 170 *(dowii)*.

Notarius Gill, l. c. 171 *(grandicassis)*.

Cathorops Jordan & Gilbert, Bull. U. S. Fish Com. 1882, 39 *(hypophthalmus)*.

This genus is composed of many well-marked subgenera, and it is, therefore, difficult to define it otherwise than by describing the sub-genera.

The species of this genus are usually marine; many are, however, found in the rivers of South America. It is found in all continents but Australia.

DOUBTFUL SPECIES OF TACHISURUS.

22.1. *Arius nigricans* Valenciennes, in Voy. d'Orb. ix, atlas ii, pl. iii, fig. 3, 1847; Cuv. & Val. Hist. Nat. Poiss. xv, 83, 1840 (Buenos Ayres).

Near *Arius albicans* C. & V. (= *Pimelodus clarias).* "Maxillary barbels not extending beyond the shoulders; mental barbels not to the base of pectorals. D. 16 (I. 6 ?) A. 20. Blackish above, silvery below; fins yellowish."

22.2. *Arius ? obesus* Schomburgk, Fishes of Guiana, part i, 174 (Rio Branco).

"Dull bluish black, paler below. Occipital process large, granulated. Dorsal and pectoral spines serrated on both edges; a spine arises beneath the gill opening and points backward. Anal fin more than usually elongate. The teeth are a series thickly set in each jaw. Rio Branco. .18 m."

ANALYSIS OF THE SOUTH AMERICAN SPECIES OF TACHISURUS.

- *a.* Head and occipital process entirely covered with skin and muscle; occipital process sparingly granulated. (GALEICHTHYS.)
  - *b.* Anal fin twice as long as high, with 22 rays; fontanel with an indistinct groove; occipital process twice as long as broad; gill-rakers 3+4; light brown, white below; the sides freckled; head 4–4½. *lentiginosus* 23.
  - *bb.* Anal fin higher than long, with 14–16 rays; fontanel continued as a deep groove to the base of the occipital process, which is more than three times as long as broad; gill-rakers 3+10: back and sides blue-black, a broad, conspicuous light band along the lateral line; head 3½. *peruanus* 24.
- *aa.* Occipital process and bones of head usually exposed, skin thin; crown of head and occipital process granular.
  - *c.* Palatine patches of teeth with a backward projecting angle on the inner margin.*
    - *d.* Dorsal plate enlarged.* (SCIADEICHTHYS.)
      - *e.* Teeth on the palate villiform, or bluntly conical.
        - *f.* Posterior nasal openings not connected by a membrane.
          - *g.* Dorsal plate pointed in front, entering the notched occipital process.
            - *h.* Eye very small, 6 or more in the interocular space.

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* See *ff.*

i. Eye 9 in the interorbital; dorsal plate emarginate behind, as wide as the cranium behind eye; granulations not extending forward to eyes; opercle and humeral process striate, not granular; dorsal and pectoral spines granular, moderately serrate. Upper jaw little longer; palatine bands of teeth oval. Maxillary barbel extending to middle of pectoral. Ventral shorter than pectoral fins; adipose one-third less than anal fin. Upper caudal lobe little the longer. D. I. 7; A. 18.* (Cuv. & Val.) *flavescens* 25.

ii. Eye 6–7 in the interorbital; dorsal plate half as wide as the skull behind the eye, pointed in front, entering the broad, short occipital process; surface of the bones striate rather than granulate. Maxillary barbels reaching tips of ventrals. D. I, 6; A. 21.† (Cuv. & Val.) *temminckianus* 26.

hh. Eye 5¼ or less in the interocular space.

j. Maxillary barbels reaching middle or end of dorsal fin. Dorsal plate as wide as long, its surface pitted. Granulations of the head extending to above middle of cheeks. An elongate patch of teeth behind each palatine patch. Upper caudal lobe 3⅔ in the length. Head 3⅗. *emphysetus* 27.

jj. Maxillary barbels not reaching beyond base of pectoral. Dorsal plate longer than wide, its surface granular. Granulations of the head extending to above the eye. No pterygoid teeth. Upper caudal lobe 5 in the length. Head 3⅐. *brandti* 28.

gg. Dorsal plate notched in front, receiving the point of occipital process.

k. Eye midway between snout and preopercle; occipital process twice as long as broad, its tip mucronate, corresponding to a notch in the dorsal plate; top of head granulated to front of eyes; opercle granulated superiorly; humeral process as long as high, strongly granulated. Ventrals as long as pectorals. Maxillary barbels not reaching beyond middle of pectorals? D. I, 7; A. 18.‡ (Cuv. & Val.) *mesops* 29.

kk. Eye nearer snout than to preopercle.

l. Jaws subequal; occipital process broader than long, mucronate at tip; dorsal plate large, butterfly-shaped; opercle striate. Eye 1¼ in snout. *proops* 30.

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*Based on a specimen .81 m. long.

†Based on a specimen .20 m. long.

‡Based on a specimen .43 m. long.

ll. Lower jaw longer; occipital process wider and shorter than in *proops*, its tip reduced; dorsal plate more or less crescent-shaped. Eye nearer snout than in *proops*. Head flat, especially forward; opercle strongly granular; humeral process obtuse, higher than long, granular; dorsal and pectoral spine granular in front, weakly serrate behind; ventrals longer than pectorals; D. I, 7; A. 17.* (Cuv. & Val.) *passany* 31.

lll. Jaws equal; dorsal plate large, almost as wide as the skull behind eye; opercle striate; top of head granular forward to between eyes; a triangular smooth area in front; humeral process, dorsal plate and outer margins of dorsal and pectoral spines granular. Snout 3 in space from eye to preopercle; eye 5 in interocular space. Maxillary barbels scarcely reach gill-opening. Adipose almost as long as anal. Caudal lobes subequal, 5⅓ in the total length. Head 4⅔ in the total, its width 1⅓ in its length. D. I, 7; A. 19.† (Cuv. & Val.) *albicans* 32.

ff. Posterior nasal openings connected by a membrane; dorsal plate and occipital process truncate where they meet, at least in the adult: in the young the dorsal plate is somewhat convex in front, the backward projecting angles of the palatine patches not developed. (SELENASPIS.)

m. Occipital process half as wide at tip as at base; its length more than half as long as its width; gill-rakers 5+10. *herzbergii* 33.

mm. Occipital process two-thirds as wide at tip as at base, its length less than one-half its greatest width; gill-rakers 7+15. *dowi* 34.

ee. Teeth on the palate granular.

n. Margin of dorsal plate and of occipital process convex where they meet; palatine patches of teeth connected by the vomerine patch in front, their inner margins not touching behind. *luniscutis* 35.

nn. Dorsal plate emarginate in front receiving the pointed occipital process; palatine patches either separate or united for their whole length. (Bleeker.) *parkeri* 36.

dd. Dorsal plate crescent shaped, not enlarged.

o. Occipital process narrowed or constricted at base. (NOTARIUS.)

p. Occipital process narrowly and deeply constricted at base, its margins regularly and strongly convex. *grandicassis* 37.

pp. Occipital process broadly and deeply constricted, wider near tip than in the middle, its margins describing a double curve, convex toward tip, concave toward base. *grandicassis parmocassis* 37a.

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*Based on a specimen .91 m. long.

†Based on a specimen .61 m. long.

ppp. Occipital process narrowed, its margins scarcely convex. *grandicassis stricticassis* 37b.

oo. Occipital process widest at its base.

q. Interorbital region granular, or if smooth the fontanel without a groove; posterior nasal openings not connected by a membrane.* (NETUMA.)

r. Fontanel not produced backward as a groove.

s. Maxillary barbels reaching to base of ventrals; head 4⅓–4½ in the length; eye 4–4⅔ in the head, 1⅓–1⅔ in interocular space; body little broader than high; caudal compressed; head depressed, acute, its width 1¼–1½ in its length, width of mouth 2⅓–2½. Occipital process keeled, not much longer than broad; snout scarcely longer than eye, depressed; a large axillary pore; dorsal spine 1¼ in head, granulated on its basal half in front, striate on sides, slightly serrate behind; adipose longer than dorsal fin, twice as long as high; pectoral spine broader but not longer than dorsal spine, its inner margin conspicuously serrated; ventrals much shorter than pectorals; anal as high as long; caudal 4⅔–6 in the length; D. I, 7; A. 18–20.† (Bleeker.) *dubia* 38.

ss. Maxillary barbels reaching about to base of pectorals; head 3⅓–3⅔ in the length; eye 8–10 in head, 4–5 in interocular width; head convex transversely, tapering forward. *kessleri* 39.

rr. Fontanel continued backward as a groove; eye 6⅓ in head, 3⅓ in the interocular space; maxillary barbels reaching middle of pectorals; shields of head finely granular. No axillary pore. *insculptus* 40.

qq. Interorbital flat and smooth, or with smooth ridges, the fontanel continued backward as a groove.

t. Vomerine patches of teeth united, except in young.

u. Groove of fontanel almost obsolete, not reaching occipital process; occipital process about as broad at base as long; its margins concave; caudal a little shorter than head; head 3⅓ in the length; shields of head rather coarsely granular. *planiceps* 41.

uu. Groove of fontanel well defined, reaching occipital process; occipital process longer than broad, its margins straight; barbels short, compressed at base.

v. Inner margin of palatine patches of teeth straight; distance between them equals the diameter of pupil. Fontanel abruptly continued as a groove. Granulations fine, irregularly scattered. Anterior margin of dorsal spine with sharp straight teeth. *platypogon* 42.

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*See *ff*.

†Based on specimens .131 and .171 m. long.

vv. Inner margin of palatine patches of teeth concave, the distance between them greater than the longitudinal diameter of the eye. Fontanel gradually continued as a groove. Granulations of head rather coarse, arranged in series. Anterior margin of dorsal spine with granules. *upsulonophorus* 43.

tt. Vomerine patches separate on the median line.

w. Spines scarcely shorter than head; head 4 in the length. *osculus* 44.

ww. Spines low; head 3⅗–3¾ in the length.

x. Teeth on palate in 4 patches, bluntly conical; vomerine patches oblong, separate from each other and from the palatine patches; palatine patches comparatively small; occipital process scarcely as long as broad. *elatturus* 45.

xx. Teeth on palate in 6 patches, villiform; vomerine patches subtriangular, separate but contiguous to the patches on palatines. Occipital process 1½ times as long as broad. *barbus* 46.

cc. Palatine patches of teeth without a backward projecting angle on the inner margin.

A. Eye above the level of the mouth; gill-rakers 25 or fewer.

B. Teeth on the palate villiform. (HEXANEMATICHTHYS.)

C. Teeth on the palate in 4 patches; the vomer and palatine patches sometimes contiguous.

D. Granulations of the head not extending forward to between the eyes.

E. Fontanel continued backward as a narrow groove.

F. Head flat, depressed in front; snout scarcely decurved; occipital keel bluntish; eye 7 in head, 3⅗ in interocular width; granulations about the head coarse, conspicuous. *seemanni* 47.

FF. Head scarcely depressed, the snout strongly decurved; occipital keel sharper than in any other species; eye 5–5½ in head, 2¾–3 in the interocular; granulations about the head less distinct than in *seemanni;* palatine patches of teeth much smaller. *jordani* 48.

EE. Fontanel not continued as a groove into the granulated region of the head.

G. Palatine patches of teeth small, scarcely larger than the vomerine patches which are oval and widely separated on median line; occipital process broader than long; head three-fourths as wide as long; eye 6½ in head, 2 in snout, 3 in the interocular space; maxillary barbels reach middle of pectorals; occipital process keeled, subtruncate posteriorly; dorsal spine 2 in head; adipose fin shorter than dorsal fin; upper caudal lobe almost as long as the head; pectoral spine as long as head without snout. Sides steel-blue, iridescent; blackish above, silvery below; vertical fins black; inner side of paired fins blackish. Head 3½–3⅝; depth 5; D. I, 7; A. 17.* (Günther.) *cærulescens* 49.

GG. Palatine patches of teeth much larger than the vomerine patches.

H. Dorsal I, 6-7. Fontanel almost obsolete, ending between the eyes; head two-thirds as wide as long. *guatemalensis* 50.

HH. Dorsal I, 7. Fontanel ending midway between tip of snout and middle of dorsal plate; adipose fin shorter than the dorsal fin; head three-fourths as wide as long. Otherwise like *guatemalensis*.† (Günther) *assimilis* 51.

DD. Granulations of the head continued forward to between the eyes.

I. Fontanel not continued backward as a groove; interorbital area without ridges; adipose fin about as high as long, shorter than the dorsal fin. Depth of head 1⅚ in its length; width 1⅙. Eye 5⅙ in the head, 2⅙ in the interocular, less than 2 in snout. Occipital process not longer than broad, not conspicuously keeled. Snout depressed; upper jaw little longer. Vomer and palatine teeth contiguous. Maxillary barbels reaching to the base of the pectoralsl Opercle smooth. Dorsal spine shorter than the pectoraspine, about 2 in the head, granulated in front, striated on sides. Caudal 4 in the length. Head 3⅜; depth 6. D. I, 7. A. 18.‡ (Bleeker.) *surinamensis* 52.

II. Fontanel continued as a groove to base of occipital process; interorbital area with 4 granular ridges.

J. Head 4⅓ in the length; dorsal spine 1¼ in head; highest anal ray less than 2 in head. *dasycephalus* 53.

JJ. Head 3⅞ in the length; dorsal spine 1¾ in head; highest anal ray 2¼ in head. *longicephalus* 54.

CC. Teeth on the palate in two patches.

K. Eye small, about 10 in the length of the head; fontanel not continued as a groove.

L. Sides of the dorsal and pectoral spines granular; fontanel angular behind; intermaxillary band of teeth four times as wide as deep; palatine patches of teeth less than diameter of eye in width. *rugispinis* 55.

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*Based on specimens .30 m. long.

†Based on a specimen .33 m. long.

‡Based on a specimen .268 m. long.

LL. Sides of the dorsal and pectoral spines striate; fontanel broadly rounded behind; intermaxillary band of teeth six times as wide as deep; palatine patches 1⅓ diameters of eye in width and length. *rugispinis phrygiatus* 55a.

KK. Eye very large, 4⅓ - 5 in head, 1⅔ - 2 in interocular; fontanel continued as a groove. *grandoculis* 56.

BB. Teeth on the palate granular; no teeth on vomer; gill membrane not forming a free margin across the isthmus.*

(TACHISURUS = *Arius* Bleeker '58.)

M. Anal rays 23 or fewer.

N. Head as broad as high; its width 1⅓ in its length.

O. Head 4, A. 21; teeth large, granular. Occipital process triangular, as long as broad, obtusely keeled; groove of the fontanel not reaching base of occipital process; palatine teeth in two subtriangular patches which sometimes meet in front. Maxillary barbels extending to near tip of pectorals. Dorsal spine slightly serrated along both edges, ⅝ as long as head; adipose fin shorter than the dorsal fin; pectoral spine as long as, but stronger than the dorsal spine. Depth 5; D. I, 7; A. 21.† (Günther).

OO. Head 3⅓; A. 19. Teeth rather small, bluntly conical. *nuchalis* 57.

NN. Head broader than high. *agassizii* 58

P. Soft portions of the head not pitted.

Q. Head 3 in the length; maxillary barbels reaching almost to the middle of the pectoral fin.‡ *fissus* 59.

QQ. Head more than 3 in the length.

R. Axillary pore as large as a nasal opening. Dorsal spine equal to distance between front of eye and gill opening; pectoral spine nearly as long and strong as the dorsal spine; groove of fontanel scarcely reaching base of occipital process; inner surface of pectorals blackish. Head 4⅓; depth 5; D. I, 7; A. 21.§ (Günther.) *melanopus* 60.

RR. Axillary pore much smaller than a nasal opening.

S. Pectoral spine reaching halfway to the posterior third of the ventrals, or shorter; upper jaw projecting; posterior margin of the eye about in the middle of the head. Occipital process greatly narrowed behind, its width at tip not more than half a diameter of the eye. Teeth on the palate large, granular, 20 or fewer, some of the posterior ones usually much enlarged. *spixii* 61.

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[*] The last point examined only in *spixii*, *fürthi* and *agassizii*.

[†] Based on specimens .15 m. long.

[‡] Based on specimens .15 m. long.

[§] Based on specimens .20-.23 m. long.

SS. Pectoral spine reaching halfway to the tip of ventral, or longer; jaws subequal; posterior margin of the eye about 1 diameter in front of the middle of the head. Occipital process not greatly narrowed behind. Teeth on the palate 40 or more, in larger patches, the teeth smaller than in *spixii*. *fürthi* 62

PP. Soft portions of the head pitted; length of head to end of occipital process little less than 3 in the length, granular portion ⅙ longer than smooth portion of the head. Fontanel not continued as a groove. Maxillary barbels extending beyond middle of pectorals. A. 22 or 23 (Cuv. & Val.) *variolosus* 63.

MM. Anal rays 27. (Kner & Steind.) *multiradiatus* 64.

AA. Eye not above the level of the mouth; gill-rakers long and slender, 40 or more. (CATHOROPS.)

T. Upper jaw much produced; interocular 2⅙ in head; mouth 2⅓ in head. Vomerine patches of teeth separated by an interval equal to 1 diameter of the eye, scarcely distinguishable from the palatine patches; palatine teeth forming a large oblong patch on either side which is broadest behind. *hypophthalmus* 65

TT. Jaws subequal; interocular 1⅔ in head; mouth 2 in head. Palatine patches of teeth about 1¼ diameters of the eye apart, the teeth in about 3 series in front, in a single series behind. *gulosus* 66.

23. Tachisurus lentiginosus.

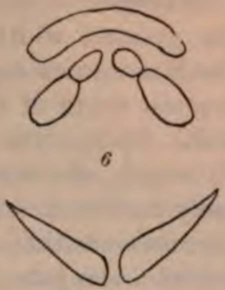
Tachisurus lentiginosus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 139 (Panama).

Habitat: Panama.

Body nearly terete anteriorly, becoming compressed backward; the width, above the pectorals, a little greater than the depth. Head flat, depressed, its depth at base of occipital process 1⅙ in its greatest width which is about 1¼ in its length. Occipital process somewhat roughened, about twice as long as its greatest width, its margin straight and oblique; the middle of the fontanel above the posterior part of the eye. Head everywhere covered with skin; sides of the head and opercle with vermiculating canals.

Eye 2½ in snout, 8½ in head, 4½ in interocular, 2¼ in interorbital.

Snout somewhat pointed; upper jaw very little projecting; lips thick; teeth all villiform; the intermaxil-



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lary band strongly curved; vomerine teeth in two oval patches joined to the larger patches of the palatines; mandibulary band of teeth separated in front, the outer margins, if continued forward, forming an angle at the symphysis.

Maxillary barbels reaching beyond base of pectorals; mental barbels reaching about $\frac{3}{5}$ toward the gill-opening, the post mentals to the gill-opening in one specimen, a little beyond in the other.

Gill-membranes forming a broad free margin across the isthmus. Gill-rakers 3+4.

Pectoral pore minute; humeral process pointed behind.

Distance of dorsal from snout $2\frac{4}{5}$ in the length, the dorsal spine covered with a membrane, its outer margin granular, its height $1\frac{3}{5}$ in the head, the first soft ray $1\frac{3}{7}$ the length of the fin. Distance of adipose fin from the dorsal $3\frac{3}{5}$–4 in the length, the fin adnate, longer than the dorsal.

Caudal lunate, the upper lobe longer, somewhat falcate, $4\frac{1}{2}$–5 in the length.

Anal fin twice as long as high, the highest ray 2–$2\frac{1}{4}$ in the head.

Ventrals short and broad, $1\frac{4}{5}$ in the head.

Pectoral spine covered with a membrane, $1\frac{1}{2}$–$1\frac{2}{5}$ in head.

Light brown, becoming nearly white below, the sides freckled, fins reddish.

Head 4–$4\frac{1}{5}$; depth 5–6; D. I, 6; A. 22.

24. Tachisurus peruvianus.

Galeichthys peruvianus Lütken, Vidensk. Meded. 1874, 205 (Callao); Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 34 (Callao; Altata; Panama).

Tachisurus peruvianus Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. vol. i, 1888, 140 (Callao).

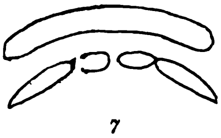
Habitat: West coast tropical America.

Subterete, tapering to a long, slender, caudal peduncle; the greatest width about equal to the greatest depth. Head not much depressed; interorbital area flattish, the greatest depth of the head 1¾ in its length; its greatest width 1⅖–1⅗; the width at the angle of mouth 2 in its length; the surface of the cranial bones longitudinally furrowed, covered with muscle and skin. Occipital process more than three times as long as wide; anterior fontanel elongate, its center over the middle of the eye, continued as a very deep groove to the base of the occipital process; a small opening a pupil's distance behind the anterior fontanel, and a larger one in the occipital bone at the end of the groove. Snout, upper part of cheek and the opercle sometimes with conspicuous reticulating mucous canals. Snout blunt, decurved.

Eye 2 in snout, 7 in head, 4 in the interocular, 2 in the interorbital.

Maxillary barbels extending beyond base of pectoral, mentals about to gill-opening, the post mentals about one diameter of the eye farther.

Jaws subequal, the upper longer; teeth all fine, villiform; intermaxillary band of teeth very wide, its depth about 8 in its width; two small patches on the vomer; palatine patches very wide and shallow, tapering to a point.



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Gill-membranes meeting at an acute angle, forming a fold across the isthmus. Gill-rakers 3+10.

Humeral process very thin, covered with skin, more than half as long as the pectoral spine, broadly expanded and rounded behind. Pectoral pore present.

Distance of dorsal spine from snout 2⅖–2¾ in the length; the dorsal spine broken off in all the specimens. Distance of adipose from the dorsal 3⅗–3⅔ in the length; adipose fin as long as the dorsal fin, adnate.

Caudal fin broadly lunate, the upper lobe longer, falcate, 3¾ in the length.

Anal fin higher than long, the highest ray 2–2⅗ in the head.

Ventrals reaching to the anal, 1½–2 in the head.

Pectoral spines broken in all the specimens.

Back, top of head and a band from humeral process to the lower caudal lobe, blue-black; a broad conspicuous, bluish-silvery band along the lateral line; lower parts white; fins blackish; ventrals and anal sometimes with light areas.

Head 3½; depth 4⅓–5½; D. I, 7; A. 14–16.

Eleven specimens .25–.35 m. long. Callao, Peru. Hassler Expedition.

25. Tachisurus flavescens.

Bagrus flavescens Cuv. & Val. Hist. Nat. Poiss. xiv, 462, 1839 (Cayenne); Kner, SB. Ak. Wien, xxvi, 1857, 386 (locality?).

Arius flavescens Günther, Cat. Fish. Brit. Mus. v, 151, 1864 (copied).

Galeichthys flavescens Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus flavescens Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (name only).

Habitat: Cayenne.

This species is known to us only from descriptions.

26. Tachisurus temminkianus.

Bagrus temminkianus Cuv. & Val. Hist. Nat. Poiss. xiv, 463, 1839 (Cayenne).

Arius temminckii Günther, Cat. Fish. Brit. Mus. v, 151, 1864 (copied).

Galeichthys temminkianus Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus temminkianus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (name only).

Habitat: Cayenne.

27. Tachisurus emphysetus.

Bagrus (Sciades) emphysetus Müller & Troschel, Horæ Ichthyol. iii, 8, 1849 (Surinam).

Arius emphysetus Günther, Cat. Fish. Brit. Mus. v, 150, 1864 (copied).

Sciades emphysetus Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 91 (name only).

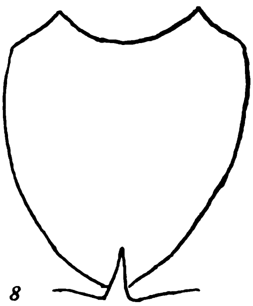
Galeichthys emphysetus Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus emphysetus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (name only).

Habitat: Surinam.

This species is closely related to *T. brandtii* being the eastern representative of that species.

Depth little greater than the width. Profile straight, less steep than in *brandtii*. Depth of the head 1¾ in its length, its width 1¼. Top of the head sparsely and coarsely granular, the granulation extending forward only to middle of cheek; fontanel bordered anteriorly by smooth ridges; occipital process coarsely and closely granular, without a prominent keel, its margins convex, its tip emarginate, not coössified with the dorsal plate; dorsal plate shield-shaped, not keeled, its surface irregularly pitted, its margin more finely graven, its length about 3½ in the head. In the specimen examined the dorsal plate seems to have been at some time slightly broken in front, a small, narrow, sharp process of the occipital process fitting into the split.



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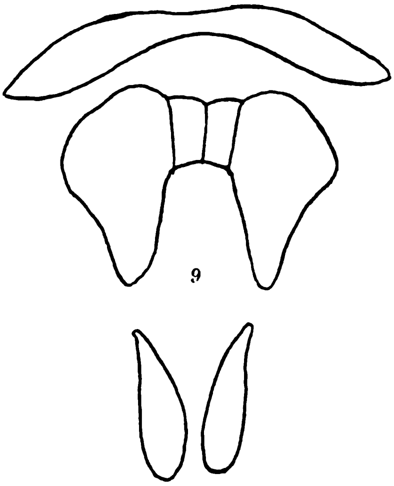

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Eyes small, 3 in the snout, 11 in the head, 5 in the interocular.

Maxillary barbels flattened, reaching to below middle or end of dorsal fin, postmentals not quite to base of pectorals. Upper jaw slightly projecting; all the teeth minute, villiform, the vomerine patch emarginate in front and behind, joined to the subtriangular palatine patches; pterygoid patches long-elliptical.

Gill membrane with a narrower free margin than in *brandtii.*

Distance of dorsal fin from tip of snout $2\frac{3}{4}$ in the length, the dorsal spine $1\frac{2}{7}$ in the head, granular in front, recurved teeth on its inner margin. Distance between the dorsal and adipose fins $3\frac{4}{7}$ in the length; adipose fin about as long as the dorsal fin.

Caudal deeply forked, the upper lobe longer, $3\frac{2}{3}$ in the length. Anal little longer than high. Ventrals reaching nearly to the anal, about 2 in the head.

Pectoral spine $1\frac{1}{4}$ in the head, its outer margin granular, the inner rather finely toothed.

The skin on the dorsal surface of the head and humeral region finely reticulate with mucous canals.

Yellowish brown, lighter below, the fins yellowish, finely punctulate.

Head $3\frac{4}{5}$; depth 6; D. I, 7; A. 18.

One specimen .51 m. Surinam.

28. Tachisurus brandtii.

? *Sciades troschelii* Gill, Proc. Acad. Nat. Sci. Philad. 1863, 171 (West Coast Central America).

? *Arius troschelii* Günther, Cat. Fish. Brit. Mus. v, 150, 1864 (copied); ib. Fish. Cent. Am. vi, 1866, 393 (Pac.)

? *Galeichthys troschelii* Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only).

Arius brandtii Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 21, pl. iii (Altata, Panama); Jordan & Gilbert, Bull. U. S. Fish. Comm. 1882, 37, 39 (Mazatlan; Punta Arenas; Panama). Jordan & Gilbert. Proc. U. S. Nat. Mus. 1882, 621 (Panama).

Galeichthys brandti Jordan, Proc. U. S. Nat. Mus. 1885, 365 (name only).

Tachisurus brandti Eigenm. & Eigenm., Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (Panama).

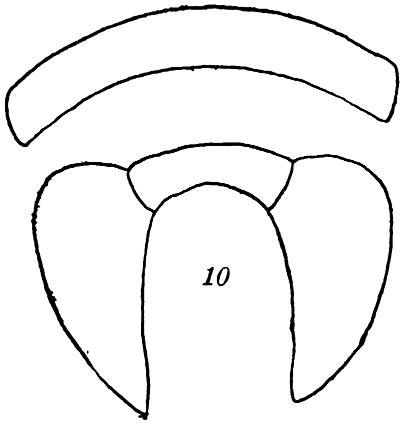
Habitat: West Coast tropical America.

The description of *S. troschelii* is evidently (dentition) based on a small specimen. It is either the young of *brandtii* or of a very closely related species.

Robust, as deep as wide; profile steep; greatest depth of the head little less than its width which is two-thirds of its length. Top of head with radiating series of granules which extend forward over the posterior part of the interorbital region; fontanel bordered anteriorly by a broad ridge which is granulated on the snout; opercle indistinctly striate, the humeral process granular, covered with thick skin. Fontanel broad, extending backward as a shallow groove. Occipital process with a median keel broader than long, the margin concave, the tip deeply emarginate, coössified with the dorsal plate in the adult; dorsal plate shield-shaped, longer than broad, about 3⅔ in head.

Eye 3 in snout, 9 in head, 5 in interocular.

Maxillary barbels reaching more than half way to the pectoral; postmentals not half way to pectorals.



Upper jaw projecting; teeth in the jaws all minute, villiform, those on the vomer in a rather narrow band, on the palate in a long triangular patch, contiguous but with a marked constriction between the patches; teeth on the vomer and palatines bluntly conical.

Gill-membranes meeting in an angle, forming a very broad free margin across the isthmus. Gill-rakers short and blunt, 4+9.

Distance of dorsal from snout 2¼ in the length; the dorsal spine 1⅞ in the length of the head, granular toothed in front, roughened behind; distance of adipose fin from the dorsal 3½ in the length; the adipose fin much longer than high; as long as the dorsal fin.

Caudal fin 5 in the length.

Anal scarcely longer than high.

Ventrals reaching almost to the anal, 2⅓ in the head.

Pectoral spine 1⅗ in head, its outer edge granular toothed, the inner with very fine teeth.

No axillary pore; no vertical series of pores.

Head brownish with purple reflections, the body metallic blue above with greenish reflections, silvery below, the sides and region about the ventrals thickly covered with brown dots; fins all dusky.

Head 3⅕; depth 4¾; D. I, 7; A. 18.

A single specimen .52 m. Panama. One of the types.

29. Tachisurus mesops.

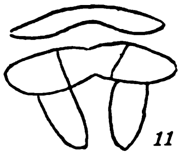
Bagrus mesops Cuv. & Val. Hist. Nat. Poiss. xiv 456, 1839, (Guiana.)
Arius mesops Günther, Cat. Fish. Brit. Mus. v, 145, 1864 (copied).
Galeichthys mesops Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).
Tachisurus mesops Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. vol. i, 1888, 141 (name only).
Habitat: Guiana.

30. Tachisurus proops

Bagrus proops Cuv. & Val. Hist. Nat. Poiss. xiv, 457, 1839 (Antilles; Guiana; Surinam; Porto Rico); Kner, SB. Ak. Wien, xxvi, 1857, 386 (loc.?)
Arius proops Günther, Cat. Fish. Brit. Mus. v, 148, 1864 (copied).
Netuma proops Bleeker, Ichth. Arch. Ind. Prod. i, 67; Bleeker, Silures de Suriname, 62, pl. vii, pl. xii, fig. 2, 1864 (Surinam).
Galeichthys proops Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).
Tachisurus proops Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. vol. i, 1888, 141 (Pernambuco).
Habitat: Northern coast of South America to Pernambuco.

Slender and elongate, broader than deep. Head depressed, its width 1⅓ in its length, its depth 2, width at mouth 2; anterior portion of the head flat above; top of the head, humeral process, and dorsal plate, coarsely granular; the granules arranged in series along the fontanel. Occipital process mucronate, broader than long; dorsal plate large, butterfly-shaped. Opercle striate; fontanel 1½ times as long as the eye, its center in front of the middle of the eye, continued as a shallow groove.

Eye 1¼–1½ in snout, 5½–8 in head, 1¾–2⅔ in the interorbital, 2¼–3¾ in the interocular.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Jaws sub-equal; teeth all villiform, the intermaxillary band very wide and shallow; teeth on the roof of the mouth in six contiguous patches.

Gill-membranes meeting in an angle, forming a broad fold across the isthmus. Gill-rakers 5+10.

Pectoral pore large; vertical series of pores.

Distance of dorsal spine from the snout, 2⅘ in the length; the dorsal spine granular in front, striate on the sides, weakly serrate behind, its length 1¼–1½ in the head. Space between dorsal and adipose fins 2⅘–3 in the length, the adipose fin little shorter than the dorsal, the posterior margin free.

Caudal deeply forked, its upper lobe longer, 4–4½ in the length.

Anal emarginate, as high as long, 2–2⅓ in the head.

Ventrals 2 in the head.

Pectoral spine roughened or granular in front, serrated behind, 1⅕–1⅓ in the head.

Plumbeous above, with blue lustre, white below; maxillary barbels dark, the mental barbels white; fins all more or less dotted with brown.

Head 4–4⅓; depth 7; D. I, 7; A. 18.

Five specimens .25–.46 m. long; Pernambuco; Hartt & Fletcher.

31. Tachisurus passany.

Bagrus passany Cuv. &. Val. Hist. Nat. Poiss. xiv, 458, 1839 (Cayenne).

Arius passany Günther, Cat. Fish. Brit. Mus. v, 149, 1864 (copied).

Galeichthys passany Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus passany Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (name only).

Habitat: Cayenne.

32. Tachisurus albicans.

Bagrus albicans Cuv. & Val. Hist. Nat. Poiss. xiv, 461, pl. 420, 1839 (Cayenne).

Galeichthys albicans Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus albicans Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (name only).

? *Bagrus Valenciennei* Castelnau, Anim. Amér. Sud, Poiss. 31, pl. xiii, fig. 1, 1855 (Amazons).

Arius valenciennesii Günther, Cat. Fish. Brit. Mus. v, 150, 1864 (copied).

Habitat: Amazon and northward.

33. Tachisurus herzbergii.

Silurus herzbergii Bloch, Ausl. Fisch. part 8, 33, pl. 367 (Surinam); Bloch & Schneider, Syst. Ichthyol. 383, 1801 (Surinam).

Bagrus herzbergii Cuv. & Val. Hist. Nat. Poiss. xiv, 453, 1839 (Mana, Cayenne); Kner, SB. Ak. Wien, xxvi, 1857, 386 (Para).

Selenaspis herzbergii Bleeker, Ichth. Arch. Ind. Prodr. i, 63.

Arius herzbergii Günther, Cat. Fish. Brit. Mus. v, 144, 1864 (British Guiana; Demerara).

Netuma herzbergii Bleeker, Silures de Suriname, 61, pl. ix, pl. xiii, fig. 3, 1864 (Surinam).

Galeichthys herzbergii Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus herzbergii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (Para; Curuca; Bahia).

Pimelodus argenteus Lacépède, Hist. Nat. Poiss. v, 94 and 102, 1801.

Bagrus pemecus Cuvier & Valenciennes, xiv, 456, 1839 (Cayenne).

Bagrus cœlestinus Müller & Troschel, Horæ Ichth. iii, 7, 1849 (Guiana).

Bagrus mesops Kner, SB. Ak. Wien, xxvi, 1857, 384, pl. i, fig. 2 (Para), (not *Bagrus mesops* C. & V.)

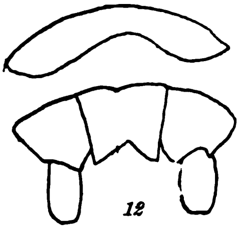
Hexanematichthys hymenorhinus Bleeker, Silures de Suriname, 57, pl. xi, fig. 2, pl. xiii, fig. 4, 1864 (Surinam).

Habitat: From Para northward.

Elongate, the width as great or greater than the depth. Width of the head 1¼–1⅓ in its length, at the angle of the mouth about 2; depth 1⅔–1¾ in its length. Humeral process, dorsal plate, top of head to between the eyes, granular. Occipital process wider than long, scarcely keeled. Fontanel not continued behind the eyes, and without backward projecting groove. Posterior nostrils connected by a membrane.

Eye 1¾–2½ in snout, 5½–8 in head, 2⅓–4 in interocular.

Barbels flattish; those of the maxillary reaching to near the ventrals, to middle of pectorals in older; postmental to or beyond base of pectoral, mental to gill opening.



Teeth villiform; vomerine and palatine patches of about equal size and shape in the young; a separate patch behind the palatines is developed later.

Gill-membranes meeting in an angle, forming a foldacross the isthmus. Gill-rakers 6+10.

Distance of dorsal spine from snout 2½–2¾ in the length; dorsal and pectoral spines subterete, the outer margins roughened, the sides striate; the dorsal spine slightly serrate behind; a little shorter than the pectoral spine, 1^{2}–1⅗ in the head; pectoral spine strongly serrate behind. Space between dorsal and adipose fins 3⅖–4 in the length. Adipose fin as long as the dorsal. Upper caudal lobe longer, about 4 in the length.

Anal as high as long, 2 in head.

Ventral 1⅗–2 in head.

Pectoral pore minute; sides with vertical series of pores.

Color plumbeous above, silvery on sides; fins dusky.

Head 3⅗–3¾; depth 5–6; D. I, 7; A. 18.

The specimens examined measure from .14–.38 metres. Para; Curuca; Bahia.

34. Tachisurus dowii.

Leptarius dowii Gill, Proc. Acad. Nat. Sci. Philad. 1863, 170 (Panama).

Arius dovii Günther, Fish. Cent. Am. vi, 1866, 393 and 476 (copied).

Arius dowii Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 50 (Panama).

Galeichthys dowii Jordan, Proc. U. S. Nat. Mus. 1885, 360 (name only).

Tachisurus dowii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 142 (Panama).

Arius alatus Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 19, pl. vi (Panama); id. Fisch-Fauna des Cauca und der Flüsse bei Guayaquil, 45, pl. v, figs. 2–2*a*, 1880 (Guayaquil); Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, pp. 37, 39 (copied); Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 621 (Panama).

Habitat: West Coast tropical America.

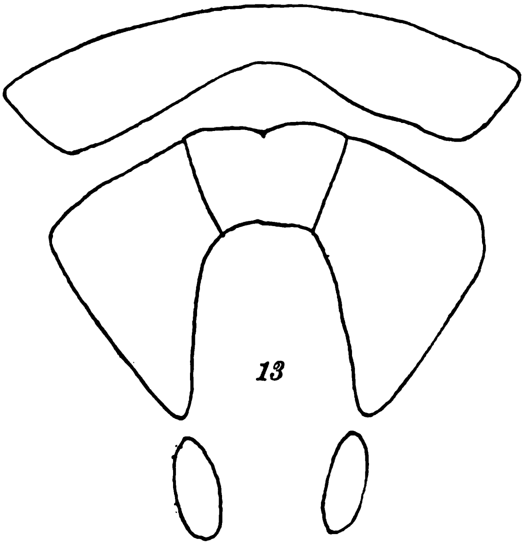
Width below the dorsal spine a little greater than the depth, less than the width at the humeral process which equals the greatest width of the head measured at the opercles. Head depressed, its depth at base of occipital process 1⅓ in the greatest width, becoming gradually more depressed forward; width at angle of mouth 1⅔ in length of head, its greatest width about 1⅓ in its length; snout short, 4 in the head. Top of head coarsely granular, the granules forming striæ in front, vermiculations posteriorly, or in places more or less regular striæ. Occipital process truncate, its width at tip greater than its length, the dorsal plate large, saddle-shaped, its bony tubercles forming striæ which are parallel with the strongly convex margin of the "saddle;" opercular bones granular striate, the humeral process with bony tubercles. Fontanel nearly obsolete, the granular bony surface being separated in front by thick skin which covers an elongate area about seven times longer than wide.

Eye small, elliptical, 3 in snout, 12 in head, 6 in interocular. A narrow flap of skin across the snout connecting the posterior nasal openings.

Maxillary barbels reaching beyond humeral process;

postmental barbels beyond gill-opening, the mentals shorter.

Upper jaw produced equal to the short diameter of the eye. Teeth of the intermaxillaries in a villiform band which is narrowed in front, not produced backward to the angle of the mouth; vomer with a rather broad band confluent with the much wider subquadrate palatine patches which are produced backward in an angle; ovate patches on the pterygoids separate from the palatine teeth; teeth of the lower jaw in a comparatively shallow band, tapering very gradually to the angle of the mouth; the teeth of the jaws minute villiform, those of the palate and vomer bluntly conical.



Gill-membranes broadly united, meeting in an angle, joined to the isthmus, but with a free margin. Gill-rakers 9+15.

Distance of dorsal from end of snout 2^3 in the length. Dorsal spine granular on sides and in front, about half the length of the head in height; distance of the adipose fin from the dorsal 3¼ in the length, the height of the adipose fin about 2½ in its length which is contained 2⅜ in the length of the head.

Caudal deeply forked, 5½ in the length.

Anterior two-thirds of the anal strongly convex, the posterior third slightly emarginate, the highest ray about 2½ in head.

Ventrals reaching to the anal, about two in the head, their distance behind the dorsal is equal to the length of the dorsal and half the dorsal plate.

Pectoral spine granulose on sides, the outer margin with a series of larger granules which become recurved notches toward the tip, the inner edge with recurved hooks, its height 1⅔ in the length of the head.

A small pectoral pore; no evident series of vertical pores.

Bluish gray above becoming white below, the fins brownish with dots.

Head 3½; depth 6; D. I, 7; A. 19.

We have examined the type of *alatus* .68 m. long, from Panama; collected by Dr. Steindachner.

35. Tachisurus luniscutis.

Arius luniscutis Cuv. & Val. Hist. Nat. Poiss. xv, 109, 1840 (Brazil); Kner, SB. Ak. Wien, xxvi, 1857, 390 (loc.?); Günther, Cat. Fish. Brit. Mus. v, 152, 1864 (Brazil; Surinam).

Galeichthys luniscutis Jordan Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus luniscutis Eigemn. & Eigenm. Proc. Cal. Acad. 2d. Ser. vol. i, 1888, 141 (Porto Alegre; Bahia; Nazareth, near Bahia; Rio Janeiro; Para; Porto Seguro; Sao Matheos; Cannavierias).

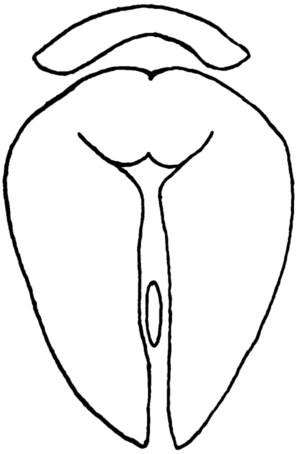
Habitat: Rio Janeiro to Surinam.

Body comparatively stout, the greatest width equaling the greatest depth. Head large, flattish above; profile descending; width of head 1⅙ in its length, width at the mouth, 2–2⅖; its depth at the base of the occipital process scarcely less than its greatest width. Top of head coarsely granular in young, the granules becoming finer and more regularly arranged in the adult; opercles smooth; humeral process with radiating lines of granules. Occipital process variable in shape, broader than long, the posterior margin convex; dorsal plate variable in outline, rounded anteriorly, saddle-shaped, either broader than long, or longer than broad; middle of the fontanel above the posterior margin of the eye; the fontanel divided into three by two bony bridges, the middle portion being more than half of its whole length. Sides of head with reticulating mucous canals. No skinny flap connecting the posterior nostrils.

Eye 2–3 in snout, 6–9 in head, 3–4½ in the interocular.

Maxillary barbels extending little beyond the base of pectoral, or shorter; mental barbels short.

Upper jaw little produced; teeth in the jaws rather large, conical; teeth of vomer and palatines finely granular, the vomerine patches separated from each other and from the palatine patches in the young, united and covering almost the entire roof of the mouth in the adult; the inner margins of the palatine patches approximated, sometimes a small elliptical patch of teeth between.



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Gill-membranes forming a broad marginal flap across the isthmus. Gill-rakers 3–4+7–9.

Axillary pore minute or wanting; vertical series of pores present.

Distance of dorsal from tip of snout 2½ in the length; the spine 1½–1⅗ in the head, granular in front, scarcely serrate behind. Distance of adipose fin from the dorsal 3¾–4 in the length, the adipose fin twice as long as high, adnate, as long as the dorsal fin.

Caudal forked, the upper lobe longer, 4½–4⅓ in the length.

Anal fin about as long as high, 2⅐–2¼ in the head.

Ventrals 1¾–2 in head.

Pectoral spine stout, 1¼–1⅐ in the head; granular in front (serrate in the very young), striate on sides, serrate along inner margin.

Color purplish brown above, sprinkled with brown dots below; fins about the color of the back.

Head 3⅗; depth 5½–6; D. I, 7; A. 16–19.

Numerous specimens examined .11–.44 m. long. Porto Alegre; Bahia; Nazareth, near Bahia; Rio Janerio; Para; Porto Seguro; Sao Matheos; Cannavierias.

36. Tachisurus parkeri.

Silurus parkeri Traill, Mem. Wern. Soc. 1832, vi, 377, pl. 6, fig. 1 (muddy waters of rivers of Guiana); Schomburgk, Fish. Brit. Guiana, part i, 188, 1843 (Guiana).

Arius parkeri Günther, Cat. Fish. Brit. Mus. v, 153 (copied).

Galeichthys parkeri Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus parkeri Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (name only).

Arius quadriscutis Cuv. & Val. Hist. Nat. Poiss. xv, 111, 1840 (Cayenne; Mana); Kner, SB. Ak. Wien, xxvi, 1857, 389 (Para).

Netuma quadriscutis Bleeker, Silures de Suriname, 59, plates viii and xiii, fig. 2, 1864 (Surinam).

Habitat: Northern coast of South America.

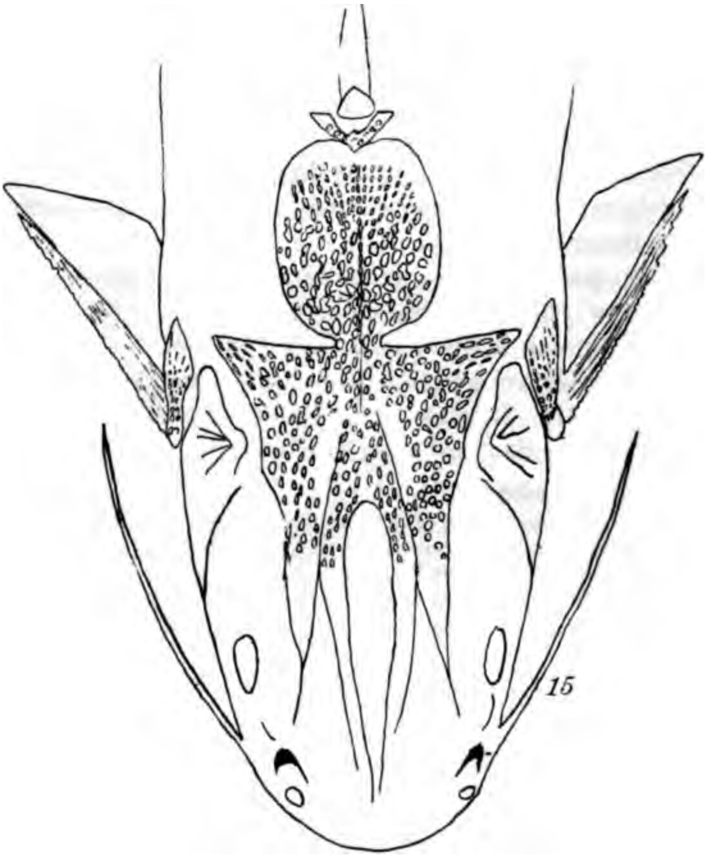
37. Tachisurus grandicassis.

Arius grandicassis Cuv. & Val. Hist. Nat. Poiss. xv, 54, pl. 427, 1840 (Guiana?); Günther, Cat. Fish. Brit. Mus. v, 153 (copied).

Galeichthys grandicassis Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus grandicassis Eigenm. & Eigenm. Proc. Cal Acad. 2d Ser. vol. i, 1888, 141 (Maranhao; Bahia).

Body cylindrical in front, tapering to a slender caudal peduncle. Head greatly depressed, profile almost straight, descending, the width of the head 1⅓–1⅖ in its length, its depth 1⅘–2 in its length.



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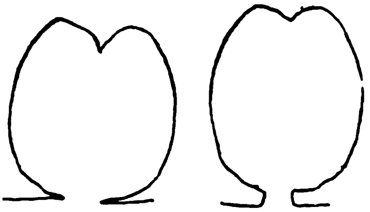
Occipital process with a deep constriction where it joins the occiput, shaped like a clover leaflet, much as *Ailurichthys panamensis*, sometimes broader than long, sometimes much longer than broad,



a *16* *b*

sometimes keeled. Center of the fontanel over the middle of eye, the fontanel not continued backward as a groove. Occipital process, top of head, and humeral process, granular; interorbital region with four ridges, the inner ones bounding the fontanel, the outer ones running obliquely backward from near the posterior nasal opening.

Eye 3–3½ in snout, 8½–10 in head, 4–4½ in interocular.

Maxillary barbels reaching to the base of the pectoral, mentals to gill-opening, postmentals a little longer.

Upper jaw projecting a diameter of the eye or more, the lip very wide, especially in front, making the nose pointed; teeth of both jaws rather large, those on the palate somewhat smaller; the depth of the intermaxillary band 7–9 in its width; the mandibulary band very shallow; vomerine teeth none in three of the examples, a small patch on one side in another specimen, and a small patch on each side in another; palatine patches triangular, produced backward.

Gill-membranes meeting in an angle, forming a fold across the isthmus. Gill-rakers 6+10.

Distance of dorsal spine from snout 2⅓–2½ in the length, the spine broken in the specimens studied. Distance of adipose fin from the dorsal 3⅗–4 in the length, adipose fin at least as long as the dorsal fin, adnate.

Caudal fin forked, the upper lobe longer, about 5 in the length, the tips broken.

Anal fin apparently longer than high, but the rays are somewhat worn off.

Ventral small.

Pectoral pore large, slit-like.

Color light brown above, somewhat smutty below from the occurrence of minute scattered dots.

Head 3⅖–3¾; depth 5⅔–6; D. I, 7; A. 18.

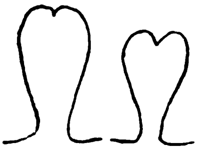
We have examined four specimens from .23 m. to .33 m. long; collected by Agassiz & Bourget, Thayer Exped. at Maranhao; and a fifth, .21 m. long, collected by Professor Agassiz at Bahia.

37a. Tachisurus grandicassis parmocassis.

Arius parmocassis Cuv. & Val., Hist. Nat. Poiss. xv, 57, 1840 (Bahia); Günther, Cat. Fish. Brit. Mus. vol. v, 154 (copied).

Tachisurus grandicassis parmocassis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (Bahia; Sao Matheos; Maranhao).

This variety differs from *grandicassis* only in having the occipital process separated from the occiput by a broader constriction and the process itself more elongate-ovate. We have examined three specimens .18–.21 m. Bahia; Sao Matheos; Maranhao. Two of the specimens have vomerine teeth, which probably form the "angle" mentioned by Cuvier & Valenciennes.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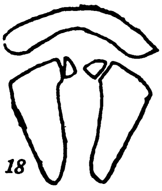
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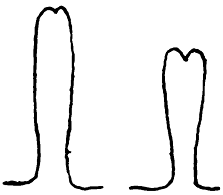
37b. Tachisurus grandicassis stricticassis.

Arius stricticassis Cuv. & Val. Hist. Nat. Poiss. xv, 58, 1840 (Cayenne); Günther, Cat. Fish. Brit. Mus. vol. v (copied); Bleeker, Silures de Suriname, 55, plate v, plate xii, fig. 4, 1864 (Surinam).

Tachisurus grandicasis stricticassis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (Bahia; Maranhao).

Habitat: Bahia to Surinam.

This variety differs from *var. parmocassis* by having the occipital process still narrower, the margins being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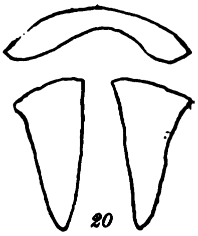
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little convex. We have examined three specimens .16, .23, and .28 m. Bahia; Maranhao. Two of them have no teeth on the vomer, the specimen .23 m. long has a single patch on one side of the vomer.

38. Tachisurus dubius.

Netuma dubia Bleeker, Versl. en Mededeel. Acad. Wet. Amsterd. 1862, xiv, 382 (Surinam); id. Silures de Suriname, 63, plate xv, fig. 2, plate xiii, fig. 5, 1864 (Surinam).

Arius dubius Günther, Cat. Fish. Brit. Mus. v, 144, 1864 (copied).

Galeichthys dubius Jordan, Proc. U. S. Nat. Mus. 1886, 550 (name only).

Tachisurus dubius Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 141 (name only).

Habitat: Surinam.

39. Tachisurus kessleri.

Arius kessleri Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 24, pl. v (Altata; Panama); Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 40 (Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 621 (Panama).

Galeichthys kessleri Jordan, Proc. U. S. Nat. Mus. 1885, 365 (name only).

Tachisurus kessleri Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 142 (Panama).

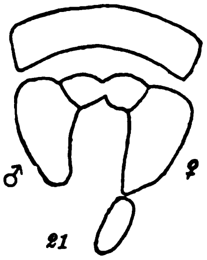
Habitat: West Coast tropical America.

Width below the dorsal spine a little greater than the depth, tapering rather rapidly backward to the caudal peduncle. Head depressed, its depth about 1⅞ in its length, the width 1⅓–1½; the width at the mouth about 1⅘; profile forming a gentle and nearly even curve; snout about 3⅓ in the head. Top of head coarsely granular, the region between the fontanel and base of occipital process being more or less granular striate; a ridge bounds the fontanel, and one extends forward about midway between this and the margin of the eye, the ridges sometimes somewhat striate or granulate, usually nearly smooth. Occipital process longer than broad, keeled, sub-truncate or emarginate, meeting the rather small dorsal plate which is granular in front; opercles slightly striate, but covered with skin which with the cheeks and post-orbital area is reticulate with muciferous canals; humeral process granulose. Fontanel broad, about 3 times as long as the eye, a bridge near its posterior end.

Eye small, elliptical, 2½–3 in snout, 8–9 in head, 4–5 in interocular.

Maxillary barbels about reaching to base of pectoral; post-mental barbels to edge of gill-membrane or farther.

Upper jaw considerably projecting lips thick and plicate; the teeth strong, rather large; teeth of the vomer in an elongate patch which is constricted, sometimes narrowly separated in the middle, contiguous with a large subtriangular patch on the palate.



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Gill-membranes forming an obtuse angle and having a broad free margin across the isthmus. Gill-rakers about half as long as the eye, 3+8.

Distance of dorsal fin from tip of snout 2⅖–2⅗ in the length; the spine granular in front, 1⅖–1⅗ in head, the highest ray not much higher than the spine; distance of adipose behind the dorsal 3⅖–3¾ in the length, the adipose fin much longer than high, as long as the dorsal fin.

Caudal fin forked, 1⅓–1½ in head.

Anal fin scarcely longer than high, slightly emarginate.

Ventrals not reaching to the anal, about two in head. Vent much nearer base of ventrals than to the origin of the anal.

Pectoral spine 1⅖–1½ in head, its outer edge granular. toothed, its inner margin with many recurved teeth.

Pectoral pore minute or obsolete; vertical series of pores none.

Head bluish brown, the body rather more bluish shading into silvery below the lateral line: the fins brownish, the pectorals bluish on the inner side of the membrane.

Head 3½–3⅔: depth 6½–5⅓: D. I, 7: A. 18.

The female differs in having the ventrals extended to the anal, their length 1⅓ in head, the dorsal spine 1⅔–2 in head; *a large oval patch of teeth on the pterygoids*, separate from the palatine patches, as in *alatus*.

The specimens examined are from .24–.41 m. long, collected at Panama, by Dr. Steindachner, Hassler Expedition.

40. Tachisurus insculptus.

Arius insculptus Jordan & Gilbert, Bull. U. S. Fish. Comm. 1882, 41 (Panama). Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 622 (Panama).

Galeichthys insculptus Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only).

Tachisurus insculptus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 143 (name).

Habitat: Panama.

41. Tachisurus planiceps.

Arius planiceps Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv. 26, pl. iv (Panama; Altata); Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 24 (Panama), id. Proc. U. S. Nat. Mus. 1882, 622 (Panama).

Galeichthys planiceps Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only).

Tachisurus planiceps Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 142 (name only).

Habitat: Panama.

42. Tachisurus platypogon.

Arius platypogon Günther, Cat. Fish. Brit. Mus. v, 147, 1864 (Guatemala); id. Fish. Cent. Am. vi, 1866, 393 (San Jose); Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 17, (Callao to Magdalena Bay); Jordan & Gilbert, Bull. U. S. Fish. Comm. 1882, 44 (Mazatlan; Libertad; Punta Arenas; Panama).

Galeichthys platypogon Jordan, Proc. U. S. Nat. Mus. 1885, 366 (Libertad; Arenas).

Tachisurus platypogon Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol i, 1888, 142 (Panama; Acapulco).

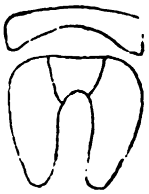
Habitat: West Coast tropical America.

Width of body equal to its depth; profile not very steep; the head flattish above, its greatest depth little less than its greatest width, which is equal to three-fourths the length of the head. Top of head finely granulated, the granules irregularly scattered, more or less concealed in the skin. Occipital process strongly keeled, longer than broad. Fontanel abruptly continued as a narrow, deep groove to the base of the occipital process; opercle smooth, with mucous canals.

Eye large, its vertical diameter 1⅓–1⅖ in its longitudinal diameter, which is 2 in snout, 6 in head, 2 in the interorbital, 3 in the interocular.

Maxillary barbels reaching beyond base of pectoral or shorter; post mentals to base of pectoral or shorter; mentals about to edge of gill-membrane.

Snout bluntish, decurved; upper jaw slightly projecting; teeth in the jaws small, villiform, those on the palate conical, the vomerine band joined to the triangular palatine patches, the inner margins of which are close together and nearly parallel, the form of the patches variable. Distance between the palatine patches equal to the diameterof the pupil.


22.

Gill-membranes united, forming a broad margin across the isthmus. Gill-rakers 6+10.

Body with vertical series of pores; pectoral pore moderate.

Distance of dorsal fin from snout 2⅗–2⅔ in the length, the spine slender, 1⅓–1⅖ in head, its margins with rather sharp, short teeth; distance of the adipose fin from the dorsal 3¼–3⅖ in the length; adipose fin as high as long, scarcely more than half as long as the dorsal fin, its posterior margin free.

Caudal 3⅓–3 in the length.

Anal scarcely longer than high, deeply emarginate.

Ventrals 1⅗–2 in head.

Pectoral spine 1⅖ in head, its outer margin faintly serrate, its inner margin more strongly serrate.

Color: violet with reflections of blue and green, shading into bluish-silvery below; sometimes with numerous dots on sides and belly; fins dusky; the dorsal portion of the inner surface of paired fins sometimes black.

Head 3½–4; depth 5–5½; D. I, 7; A. 18–19.

We have examined 9 ♂ specimens .28–.31 m. Panama; Acapulco.

43. Tachisurus upsulonophorus.

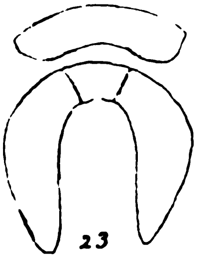
Tachisurus upsulonophorus E. &. E. Proc. Cal. Acad. Sci. 2d Ser. ii, 1889, 31; one specimen .33 m. Rio Grande do Sul.

Form of *T. platypogon*, the head wider and more depressed. Width of the body equal to its depth. Profile slightly arched, not very steep. Head flattish above the eyes, its greatest depth equal to the post orbital portion plus the orbit; greatest width of head 1¼ in its length. Top of head rather coarsely granulated, the granules arranged in *regular* longitudinal *series*. Occipital process strongly keeled, longer than broad, its granulations also striate. Fontanel *gradually* passing into a groove which is continued to base of occipital process.

Eye large, *its vertical diameter* 1⅗ *in its longitudinal diameter* which is 2⅓ in the snout, 6½ in the head, 3 in the interocular.

Maxillary barbels reaching little beyond base of pectorals, postmentals not quite to pectorals, mentals not to gill-opening.

Snout somewhat blunt, less decurved than in *platypogon;* uppre jaw slightly projecting; teeth villiform, the inner margins of the palatine patches *concave, distant* 1⅕ *longitudinal diameters of the eye.*



23

Gill-membranes forming a much narrower fold across the isthmus than in *platypogon*.

Vertical series of pores on the sides of the body.

Distance of dorsal fin from tip of snout little more than 2½ in the length, the spine 1⅖ in the head, its anterior margin with low, blunt granules.

Distance of the adipose from the dorsal fin 4 in the length, adipose fin as long as the dorsal fin minus the fulcrum. Caudal widely forked, 3⅗ in the length.

Anal little longer than high, deeply emarginate.

Ventral 2 in the head.

Metallic blue above, shading into silvery below; inner surface of the pectorals wholly blue-black, except the posterior margin which is light; ventrals lighter, but marked in the same way.

Head 3⅔; depth 5⅓; D. I, 7; A. 17.

44. Tachisurus osculus.

Arius osculus Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 46 (Panama).

Galeichthys osculus Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only).

Tachisurus osculus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 142 (Panama).

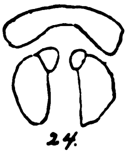
Habitat: Panama.

Rather slender, the greatest width equals the depth. Head short and broad, the greatest width 1⅕ in its length; its greatest depth 1⅖ in its length; interorbital area flattish, smooth; top of head, dorsal plate and humeral process coarsely granular; opercles faintly striate. Occipital process little broader than long, ridged rather than keeled, the margins concave; middle of fontanel over the posterior margin of the eye; fontanel produced backward in a groove which is about as long as the eye.

Eye 2 in snout, 6 in head, 2⅘ in the interocular.

Maxillary barbels not reaching beyond the gill-opening, not to base of pectoral; mental barbels not reaching to edge of gill-membrane; postmentals to gill opening.

Upper jaw considerably projecting; width of the mouth 2 in the head; teeth all villiform; the depth of the intermaxillary band 4 in its width; vomerine patches of teeth small (the patch on one side twice as large as on the other), and separated by a groove from the large sub-rhomboidal patches on the palatines.



24.

Gill-membranes meeting in an angle and forming a fold across the isthmus. Gill-rakers 4+9.

Pectoral pore none, vertical series of pores inconspicuous.

Distance of the dorsal fin from tip of snout 2⅔ in the length, the dorsal spine equal to the length of the head, granular in front and on the sides, minute teeth on its inner margin, the first soft ray higher than the spine; distance of the adipose fin from the dorsal 3½ in the length. Adipose fin more than twice as long as high, as long as the dorsal fin, adnate.

Anal emarginate, scarcely longer than high, the highest ray about 2 in the head.

Ventrals reaching the anal, 1½ in head, the inner ray with a dermal fold.

Pectoral spine strong, curved, depressed, little shorter than the dorsal spine, both margins with small, irregular teeth.

Light brown, fins somewhat dusky.

Head 4; depth 5⅓; D. I, 7; A. 18.

A single specimen, ♀ .26 m. Panama; Steindachner.

This specimen differs from the description of the type, but the difference may be due to the sex.

45. Tachisurus elatturus.

Arius elatturus Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 45 (Panama).

Galeichthys elatturus Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only).

Tachisurus elatturus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 142 (name only.).

Habitat: Panama.

46. Tachisurus barbus.

Pimelodus barbus Lacépède, Hist. Nat. Poiss. v, 94, 106, 1803.

Galeichthys barbus Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus barbus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 142 (Campos; Rio Doce; Rio Grande do Sul).

Pimelodus commersonii Lacépèd, Hist. Nat. Poiss. v, 95, 108, pl. 3, fig. 1, 1803 (locality?).

Bagrus commersonii Valenciennes, in d'Orbigny, Voy. Amér. Mérid. Poiss. Atlas ii, pl. 3, fig. 1, 1847; Cuvier & Valenciennes Hist. Nat. Poiss. xiv, 449, 1839 (Montevideo; Rio Janeiro); Kner, SB. Ak. Wien, xxvi, 1857, 386 (Rio Janeiro).

Arius commersonii Günther, Cat. Fish. Brit. Mus. v, 143, 1864 (Bahia); Hensel, Wiegm. Arch. 1870, i, 69 (Guahyba and larger tributaries); Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstlichen Brasiliens, iii, 85 (Bay of Rio Janeiro; Rio Grande do Sul; Rio Parahyba near Campos; Rio Doce; Santos).

Bagrus barbatus Quoy & Gaimard, "Voy. Uran. Zool. 230, pl. 49, figs. 1 and 2, 1824."

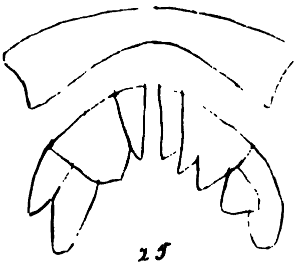
Pimelodus versicolor Castlenau, Anim. Amér. Sud, Poiss. 35, pl. 16, fig. 3 (Rio Araguay; Goyaz).

Habitat: Rio Plata and northward, ascending rivers.

Body rather slender, little deeper than wide, the caudal peduncle compressed. Head large, somewhat depressed, its width 1⅓ in its length, width at angle of the mouth 2, its depth 1½. Interorbital area flattish, having four obscure ridges in the old. Top of head coarsely granular, the granules in series along the fontanel and toward the eyes; opercles and occipital process smooth. Occipital process ½ times as long as broad, sharply keeled in the young. Fontanel 3½ times as long as the eye, its centre over the middle of the eye, continued as a groove to the occipital process.

Eye 2–2½ in snout, 5½–8½ in head, 3–4½ in the interocular.

Maxillary barbel reaching little beyond base of pectoral, mental barbel not to gill-opening, postmental barbel extending considerably beyond the gill-opening.



Snout blunt, little decurved, upper jaw little produced. Teeth villiform, the intermaxillary band emarginate on the sides and behind; teeth on the roof of the mouth in from 3–5 confluent patches on each side; vomerine patches separated from each other.

Gill-membranes meeting in an angle, forming a fold across the isthmus. Gill-rakers 6+10.

Distance of dorsal spine from tip of snout 2½–2⅗ in the length. Dorsal and pectoral spines granular in front, striate on the sides, the dorsal spine scarcely roughened behind, 1⅔–1⅗ in the head: the pectoral spine serrated behind, its length about 1⅓ in the head. Space between the dorsal and adipose fins 3⅓ in the length. Adipose fin scarcely shorter than the dorsal, its posterior margin free.

Upper caudal lobe longer, falcate, 3½–4 in the length.

Anal fin about as high as long, 2½ in the head.

Ventrals not reaching to the anal, about 2 in head.

Color, in specimen No. 7702, light brown, silvery on sides, white below: tip of dorsal and pectoral fins dusky; all the fins more or less dotted with brown: all the other specimens plumbeous above, white below: fins dusky.

Head 3¾–3⅞: depth 5–5½: D. I, 7: A. 19.

The specimens examined, .13–.48 m. long, are from (7702) Campos: Rio Doce: Rio Grande do Sul.—(the smaller specimens from this locality have the occipital keel very strongly developed).

A specimen from the Rio Grande do Sul, .42 m. long, has a much stouter form, the dorsal and pectoral spines more or less covered with a membrane, the pectoral spine $1\frac{5}{7}$ in the head, the dorsal spine $1\frac{4}{5}$; the granulations of the head covered with skin and much less conspicuous than in the other examples; the space between dorsal and adipose fins 4 in the length; the barbels all thick and fleshy.

47. Tachisurus seemanni.

Arius seemanni Günther, Cat. Fish. Brit. Mus. v, 147, 1864 (Central America); id, Fish. Cent. Am. vi, 1866, 393; Jordan, Proc. Phil. Acad. Nat. Sci, 1883, 282 (notes on type specimen).

Galeichthys seemanni Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only).

Tachisurus seemanni Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 142 (Panama).

??*Arius assimilis* Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 47 (Mazatlan). (Not *Arius assimilis* Günther.)

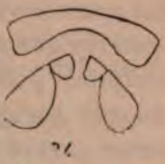
Habitat: West Coast of Tropical America.

Body about as deep as wide, tapering to a slender peduncle. Head flat, depressed in front, top of the head coarsely granular; opercles smooth or with faint striations; humeral process slightly granular, covered with skin; the greatest depth of the head $1\frac{3}{5}$ in its length, greatest width $1\frac{1}{3}$–$1\frac{2}{5}$; the width at angles of the mouth $2\frac{1}{3}$. Occipital process wider than long; fontanel open to above the posterior margin of the eye, with a deep backward-extending groove.

Interorbital area smooth, without ridges.

Eye 2 in snout, 7 in head, $3\frac{3}{5}$–4 in the interocular, $2\frac{1}{3}$ in the interorbital.

Maxillary barbels reaching slightly beyond base of pectorals, mental barbels two-thirds toward the gill opening, the postmentals half a diameter of the eye behind the gill opening or farther.



Upper jaw longer; teeth all villiform; vomerine teeth in two small ovate patches which are separated from each other but joined to the much larger palatine patches.

Gill-membranes forming a moderate fold across the isthmus. Gill-rakers 5+12.

Pectoral pore large; vertical series of pores present.

Distance of dorsal fin from tip of snout 2⅓–2⅗ in the length, the spine rather stout, 1⅔ in head; its outer edge granular toothed, its inner edge with short, recurved teeth; distance of the adipose fin from the dorsal 3½–3⅙ in the length; adipose fin slightly longer than high, shorter than the dorsal fin.

Caudal 4 in the length.

Anal emarginate, little longer than high.

Ventrals 1¾–2 in the length of the head.

Pectoral spine 1⅓ in head, its anterior margin granular toothed, its inner edge with long, straight teeth.

Plumbeous, silvery below; fins dusky, inner surface of ventrals and pectorals dark.

Head 3¾; depth 5; D. I, 7; A. 18.

One ♀ .28 m. Panama.

One ♂ .21 m. Panama.

48. Tachisurus jordani.

?*Arius assimilis* Jordan & Gilbert (not of Günther) Bull. U. S. Fish Comm. 1882, 47 (Mazatlan).

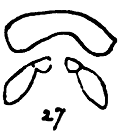
Tachisurus jordani Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser; vol. i, 1888, 142 (Panama).

The specimens agree very closely with the description of *assimilis* by Jordan & Gilbert. They differ in the width of the mouth and in having a pectoral pore.

Rather robust, the width little less than the depth; caudal peduncle compressed. Head heavy, little broader than high, its height 1½ in its length, its width 1⅖–1⅓, width at the angle of the mouth 2–2¼. Interorbital area flat and smooth; posterior portion of the head finely and sparsely granular; opercle and humeral process smooth; occipital process about as long as broad, unusually sharply keeled. Fontanel extending to above the posterior part of the orbit, continued as a deep groove to base of occipital process.

Eye large, 1¾ in snout, 5½ in head, 2 in the interorbital, 2¾–3 in the interocular.

Maxillary barbels extending to the pectoral pore, postmentals at least to the gill opening, mental about three-fifths as long as the postmental barbels.



Snout blunt, decurved; upper jaw a little produced. Teeth all villiform, those on the vomer forming two small, separate, ovate patches, which are contiguous to the twice or thrice as large palatine patches.

Gill-membranes forming a fold across the isthmus. Gill-rakers 6+9.

Pectoral pore large; vertical series of pores present.

Distance of dorsal spine from tip of snout 2⅖–2⅘ in the length; the spine of the dorsal and pectoral fins granular on the basal half of their outer margin; almost the entire inner margins serrate, the spines of equal length, 1½ in head.

Distance of adipose fin from the dorsal 3⅖ in the length; the adipose more than half as long as the dorsal fin, its posterior margin free.

Caudal deeply forked, the upper lobe longer, somewhat falcate, 3¾–4 in the length.

Anal fin about as long as high, deeply emarginate, its highest ray 2⅖ in the head.

Ventral fins not reaching to the anal, 2 in the head.

Dorsal surface dark blue with metallic lustre, becoming silvery below; lower caudal lobe dusky; basal half of the inner surface of the paired fins black.

Head 3⅖–3⅗; depth 5½–5⅚; D. I, 7; A. 18.

49. Tachisurus cærulescens.

Arius cærulescens Günther, Cat. Fish. Brit. Mus. v, 149, 1864 (Guatemala); id. Fish. Cent. Am. vi, 1866, 393 (name only); Jordan, Proc. Acad. Nat. Sci. Philad. 1883, 282.

Galeichthys cærulescens Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only).

Tachisurus cærulescens Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 142 (name only).

Habitat: West Coast of tropical America.

50. Tachisurus guatemalensis.

Arius guatemalensis Günther, Cat. Fish. Brit. Mus. v, 145, 1864 (Guatemala); Günther, Fish. Cent. Am. vi, 1866, 393 (Chiapam; Panama); Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 48 (Mazatlan; Colima); not *Arius guatemalensis* Steind.

Galeichthys guatemalensis Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only).

Tachisurus guatemalensis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 143 (name only).

Habitat: West Coast of tropical America.

51. Tachisurus assimilis.

Arius assimilis Günther, Cat. Fish. Brit. Mus. v, 146, 1864 (Guatemala); id. Fish. Cent. Am. vi, 1866, 393, 475 (Lake of Yzabel); id. Trans. Zool. Soc. 1868, 475 (locality ?); Steindachner, Fisch-Fauna Magd. Stromes, 23, 1878 (Magdalena River); Jordan, Proc. Acad. Nat. Sci. Philad. 1883, 281.

Galeichthys assimilis Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus assimilis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 143 (name only).

Habitat: East Coast of Central America.

52. Tachisurus surinamensis.

Hexanematichthys surinamensis Bleeker, Versl. & Mededeel. Akad. Wet. Amsterd. 1862, xiv, 380; id. Silures de Suriname, 55, plate vi, fig. 2, and plate xii, fig. 1, 1864 (Surinam).

Arius surinamensis Günther, Cat. Fish. Brit. Mus. v, 148, 1864.

Galeichthys surinamensis Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus surinamensis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 143 (name only).

Habitat: Surinam.

53. Tachisurus dasycephalus.

Arius dasycephalus Günther, Cat. Fish. Brit. Mus. vol. v, 157, 1864 (Sandwich Islands); Steindachner, SB. Ak. Wien, lxxiv, 1876,

Ichthyol. Beitr. iv, 26 (Panama); Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 51 (Panama); Jordan, Proc. U. S. Nat. Mus. 1882, 622 (Panama).

Galeichthys dasycephalus **Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only).**

Tachisurus dasycephalus **Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 143 (name only).**

Habitat: West Coast tropical America; Sandwich Islands.

54. Tachisurus longicephalus.

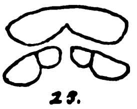
Tachisurus longicephalus **Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 143 (Panama).**

Elongate, slender; greatest width little greater than the depth. Head long and depressed, its greatest width 1½ in its length, its greatest depth little more than half its length. Top of head with faint granules almost entirely concealed by the skin; interorbital area flat and with four ridges which are obscurely granular, the inner two bordering the fontanel, the outer ones curved in front extending obliquely backward from near the posterior nasal opening; occipital process as long as broad, its margins concave; fontanel produced as a deep groove to the base of occipital process; opercle faintly striate; humeral process entirely covered with thick skin, not granular.

Eye lateral, well above the angle of the mouth, its diameter 1½ in snout, 6 in head, 3 in interocular; snout depressed and rounded in front.

Maxillary barbels extending scarcely beyond base of pectorals, mentals not to gill opening.

Upper jaw little projecting; width of the mouth 2⅙ in the head; intermaxillary teeth long and slender, the depth of the band 4½ in its width; vomerine and palatine teeth obtusely conical, the vomerine patches separate, contiguous to, but not confluent with the palatine patches.


29.

Gill-membranes not forming an angle where they meet, with a rather broad free margin. Gill-rakers short and thick, 4+5.

Pectoral pore small; vertical series of pores present.

Distance of dorsal fin from tip of snout $2\frac{3}{5}$ in the length, the spine $1\frac{3}{4}$ in the head, its outer margin granular toothed near its base, its inner margin with short teeth; distance of adipose fin from the dorsal $3\frac{1}{6}$ in the length.

Adipose fin much longer than high, as long as the dorsal fin.

Caudal forked, the upper lobe one-third longer than the lower, very nearly as long as the head, $3\frac{4}{5}$ in the length.

Anal fin emarginate, scarcely longer than high, its height $2\frac{1}{3}$ in the head.

Ventrals reaching almost to the anal, about 2 in head.

Pectoral spine a little longer than the dorsal spine, $1\frac{3}{5}$ in the head; its outer edge roughened, inner edge with rather sharp teeth.

Brown above, the sides silvery, entire ventral surface sprinkled with brown dots; a black median line on the back; fins dusky; barbels blackish.

Head $3\frac{3}{5}$; depth $6\frac{1}{2}$; D. I, 7; A. 20.

4972. One specimen ♂ .29 m. long. Panama. Steindachner.

55. Tachisurus rugispinis.

Arius rugispinis Cuv. & Val. Hist. Nat. Poiss. xv, 77, 1840 (Cayenne); Kner, SB. Ak. Wien, xxvi, 1857, 388 (Para); Günther, Cat. Fish. Brit. Mus. v, 156, 1864 (copied).

Galeichthys rugispinis Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus rugispinis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 145 (Para).

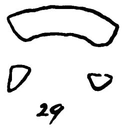
Habitat: Para and northward.

Slender, compressed on the tail. Head broad and depressed, tapering forward; width of the head, $1\frac{1}{2}$–$1\frac{2}{5}$ in its length, at the angle of the mouth $2\frac{2}{5}$–$2\frac{1}{2}$; depth of the head $1\frac{3}{5}$–2; profile rather steep. Top of head, humeral process, front and sides of the spines, and dorsal plate granular, the granulation not extending forward to above middle of cheeks. Occipital process triangular, about as long as broad, the median ridge not very prominent. Middle of fontanel behind the eye, the posterior portion separated by a bridge, not continued backward as a groove; interorbital region with four ridges.

Eye small, 3 in snout, 10 in head, 3½ in the interocular.

Barbels villiform. Maxillary barbel reaching to or beyond base of pectoral; postmental to gill-opening, mental barbels much shorter.

Mouth inferior, lower jaw included, lips thick; teeth villiform, the anterior ones in the jaws longer; depth of the intermaxillery band 4 in its width; palatine patches 1 diameter of the eye apart, the width of the patches less than one diameter of the eye.



Gill-membranes meeting in an angle, forming a fold across the isthmus. Gill-rakers 6+11.

Pectoral pore none; vertical series of pores present.

Distance of dorsal spine from the snout 2⅓–2½ in the length, the spine broken in the specimens. Space between dorsal and adipose fins 4–4⅔ in the length. Adipose fin adnate, as long as the anal fin.

Ventrals 2½ in the head.

Pectoral spine serrated behind (broken).

Head 3½–4; depth 5½–6; D. I, 7; A. 19–21.

Two specimens .22 and .26 m. long. Para. Agassiz and Bourget.

55a. Tachisurus rugispinis phrygiatus.

Arius phrygiatus Cuv. & Val. Hist. Nat. Poiss. xv, 79, 1840 (Cayenne); Günther, Cat. Fish. Brit. Mus. v, 156, 1864 (copied).

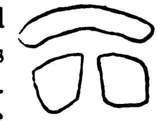
Galeichthys phrygiatus Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus phrygiatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 145 (Maranhao).

Arius dieperinki Bleeker, Silures de Suriname 50, pls. x, and xii, fig. 3, 1864 (Surinam).

Habitat: Maranhao and northward.

This example differs from those described above, in having the sides of the spines striate, the fontanel broadly rounded behind, the intermaxillary band of teeth 6 times as wide as deep, the palatine patches 1½ diameters of the eye in width and length.



30

No. 7694, one specimen .27 m. Maranhao.

56. Tachisurus grandoculis.

Arius grandoculis Steindachner, SB. Ak. Wien, lxxiv, 1876. Süsswasserfische südöstlichen Brasilines iii, 86, pl. xi (Rio Doce).

Tachisurus grandoculis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 145 (Rio Doce).

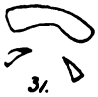
Habitat: Rio Doce.

Form compressed, the width about a third less than the depth, the nose rather pointed. Head a little higher than broad, its height (at base of occipital process) 1⅓–1½ in its length, its width 1½, at the angle of the mouth 2½. Granulations of the head rather fine, extending usually, to above the anterior part of the orbit, forming striæ. Occipital process long, its width, at base, about 1½ in its length; at tip nearly 3; granular, its ridge somewhat blunt. Fontanel long, its center nearly over the middle of the eye or a little in front, continued backward as a groove.

Eye very large, 1½ in snout, 4⅓–5 in head, 1⅕ in interorbital, about 1⅔–2 in interocular.

Maxillary barbels reaching past the middle of the pectoral, the mentals past the gill-opening and the postmentals beyond base of pectoral fin. All the barbels shorter in larger specimens.

Snout decurved, projecting beyond the lower jaw, the mouth wholly inferior. Teeth all villiform, on the palate in two small, widely separated patches; no teeth on the vomer.



31.

Gill-membranes forming a fold across the isthmus. Gill-rakers 5+11.

Pectoral pore moderate; vertical series of pores present.

Distance of dorsal spine from tip of snout 2⁴⁄₇ in the length; outer margin of the spine slightly granular, the inner margin somewhat serrate; its length 1½–1¼ in the head.

Space between dorsal and adipose fins 3⅙–3⅖ in the length; adipose fin shorter than the dorsal fin, its posterior margin free.

Caudal fin deeply forked, the upper lobe longer, somewhat falcate, 3⅙ in the length.

Anal fin emarginate, about as long as high, the highest ray 2 in the head.

Pectoral spine longer than the dorsal spine, its outer margin roughened, its inner margin sharply serrate, its length 1⅓–1⅕ in the head.

Plumbeous above, white below; all the fins beautifully peppered with brown spots.

Head 3¾–3⅘; depth 4⅓–5½; D. I, 7; A. 19–20.

Three specimens .25 m.–.32 m. long. Rio Doce; Hartt & Copeland.

57. Tachisurus nuchalis.

Arius nuchalis Günther, Cat. Fish. Brit. Mus. v, 171, 1864 (British Guiana).

Galeichthys nuchalis Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Tachisurus nuchalis Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. vol. i, 1888, 145 (name only).

Habitat: British Guiana.

58. Tachisurus agassizii.

Tachisurus agassizii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 145 (Rio Grande do Sul).

Habitat: Rio Grande do Sul.

Body compressed, especially backward, the depth greater than the width. Head narrowed forward, its greatest width 1½ in its length, its greatest depth about 1⅓; width at the mouth 2¼ in the length of the head. Top of head granular, the granulations forming striæ nearly everywhere; occipital process as broad as long, with a median ridge, the margins concave. Middle of the fontanel over the posterior margin of the pupil, continued backward as a triangular groove to near base of occipital process; interorbital area with the usual four smooth ridges; humeral process roughened, covered with skin; sides of the head with reticulating mucous canals.

Eye 1½ in snout, 5⅓ in head, about 3 in interocular, 2 in interorbital space.

Maxillary barbels about reaching gill-opening; mentals extending about half way to gill-opening, the postmentals not much longer.

Upper jaw projecting; teeth villiform in the jaws, subgranular or bluntly conical on the palate, small; *no granular teeth in the inner series of the mandible;* the palatine patches smaller and more diverging than in *spixii*.

Gill-membranes united, joined to the isthmus. Gill-rakers 8+14. Pectoral pore moderate.

Distance of dorsal spine from snout 2½ in the length, the spine 1½ in head, serrate on its posterior margin, granulate in front along basal half, becoming nearly smooth above.

Space between dorsal and adipose fins 3½ in the length; the adipose shorter than the dorsal fin, free posteriorly.

Caudal forked, 4⅗ in the length.

Anal fin a little longer than high, its highest rays about half length of head.

Ventral fins about 2 in the head.

Pectoral spine as long as the dorsal spine, but stronger, serrate on its inner margin, granular along its outer margin.

Dorsal surface brown; sides and ventral surface silvery; fins smutty.

Head 3½; depth 5; D. I, 6; A. 19.

This species is known only from the type. One specimen, No. 7,670; length .235 m. Rio Grand do Sul. Senhor Albuquerque.

59. Tachisurus fissus.

Arius fissus Cuv. & Val. Hist. Nat. Poiss. xv, 107, 1840 (Cayenne); Günther, Cat. Fish. Brit. Mus. vol. v, 172, 1864 (Cayenne); Bleeker, Silures de Suriname, 52, pl. iv, fig. 1, 1864 (Surinam).

Galeichthys fissus Jordan, Proc. U. S. Nat. Mus. 1886, 558 (name only).

Tachisurus fissus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 146 (name only).

? *Arius puncticulatus* Cuv. & Val. Hist. Nat. Poiss. xv, 108, 1840 (Buenos Ayres).

Habitat: Northern coast of South America.

60. Tachisurus melanopus.

Arius melanopus Günther, Cat. Fish. Brit. Mus. v. 172, 1864 (Rio Motagua); id. Fish. Cent. Am. vi, 1866, 393 (name only); Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthy. Beitr. iv (Panama).

Galeichthys melanopus Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only); Jordan, Proc. U. S. Nat. Mus. 1886, 558 (name only).

Tachisurus melanopus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 146 (name only).

Habitat: West Coast tropical America.

61. Tachisurus spixii

Pimelodus albidus Spix, Gen. Spec. Pisc. 19, pl. vii, fig. 1, 1829 (Equatorial Brazil).

Pimelodus spixii Agassiz in Spix. Gen. Spec. Pisc. 19, 1829.

Arius spixii Cuv. & Val. Hist. Nat. Poiss. xv, 76, 1840 (copied).

Tachisurus spixii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 146 (Maranhao; Bahia; Rio Janerio; Para; Santos in Sao Paulo; Abrolhos).

Arius arenatus Cuv. & Val. Hist. Nat. Poiss. xv, 106, 1840 (Cayenne); Günther, Cat. Fish. Brit. Mus. vol. v, 172, 1864 (copied); Bleeker, Silures de Suriname 53, pl. iv, fig. 2, 1864 (Surinam).

Galeichthys arenatus Jordan, Proc. U. S. Nat. Mus. 1886, 558 (name only).

Arius laticeps Günther, Cat. Fish. Brit. Mus. v, 171, 1864 (Brit. Guiana; Trinidad).

Galeichthys laticeps Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Habitat: Santos to Surinam.

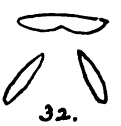
Tachisurus fissus seems to differ from this species in the proportions of the head. As the figure of *spixii* in this respect agrees with the description of *A. arenatus* C. & V., it is more probable that Agassiz figured this species and not *fissus*, as Dr. Günther supposed. Moreover, *fissus* has not yet been found in Brazil, and the *P. spixii* Agassiz is said to have come from equatorial Brazil. The name *Pimelodus albidus* is preoccupied, and the name *spixii* should supersede *arenatus*. We are unable to distinguish *Arius laticeps* Günther from *A. spixii* Ag. and *A. arenatus* Cuv. & Val.

Body compressed, especially toward the caudal fin; the depth greater than the width. Head narrowed forward, its greatest width 1⅓ in its length, its greatest depth 1½; width at the mouth 2⅙ in the length of the head. Top of the head granular in the young, the granules becoming more or less united in the adult, forming fine reticulating ridges, especially on the occipital process; occipital process longer than broad, with a blunt median ridge, the margins concave. Fontanel narrow, without interruptions, continued as a deep tapering groove to near the base of the occipital process; interorbital area with four ridges; opercles and humeral process roughened, covered with skin; sides of the head and snout with reticulating mucous canals.

Eye 1½–2 in the snout, 5–6½ in the head, 2¾–3 in the interocular.

Maxillary barbels varying in extent, from about the middle of the pectoral to the base of the ventrals; postmental barbels extending to base of pectoral or to near its tip; mentals to edge of gill membrane or to beyond base of pectoral.

Upper jaw projecting; lips more or less papillose; teeth, on the intermaxillary and the outer ones of the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mandible, villiform; the inner series of the mandible and the palate with granular teeth; the palatine patches of teeth small, subovate, sometimes contiguous in front.

Gill-membranes united, joined to the isthmus, not forming a free margin across it. Gill-rakers 6+11–13.

Pectoral pore moderate.

Distance of dorsal spine from snout $2\frac{1}{3}$–$2\frac{4}{7}$ in the length; the spine $1\frac{1}{5}$–$1\frac{1}{2}$ in the head, serrated on its inner margin, granular or almost smooth on its outer margin. Distance of adipose from the dorsal fin $3\frac{1}{5}$–$3\frac{3}{5}$ in the length, the adipose fin shorter than the dorsal fin, free posteriorly.

Caudal forked, the upper lobe slightly the longer, 4–5 in the length.

Anal fin scarcely longer than high, its highest ray about 2 in the head.

Ventral fin $1\frac{2}{3}$–2 in the head.

Pectoral spine strong, about as long as the dorsal spine, serrated on its inner margin, granular or scarcely roughened on the outer margin.

Color brownish above, sides and ventral surface silvery, sometimes with brown dots.

Head $3\frac{3}{5}$–4; depth 5–$5\frac{1}{2}$; D. I, 7; A. 21.

We have examined over 70 specimens measuring from .07–.24 m. from Maranhao; Bahia; Rio Janeiro; Para; Santos in Sao Paulo; Abrolhos, Brazil.

The specimens from Para are much darker in color, the lips more papillose, the barbels longer than those of other specimens. The Santos specimens are ashy above, white below the lateral line, with rather large brown dots on sides, becoming fewer below.

62. Tachisurus fürthii.

Arius fürthii Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 29 (Panama); Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 39 and 52 (copied).

Galeichthys fürthii Jordan, Proc. U. S. Nat. Mus. 1885, 366 (name only).

Tachisurus fürthii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 146 (Panama).

Habitat: Panama.

Body compressed posteriorly; profile slightly convex. Head broad, tapering forward, its greatest width $1\frac{2}{5}$–$1\frac{1}{2}$ in its length; width, at the angle of the mouth, $2\frac{3}{5}$–$2\frac{4}{5}$ in the head. Top of head densely covered with fine granules. Occipital process about as long as broad, with a median ridge, emarginate on its sides and at tip; interorbital region with four smooth ridges, the inner bordering the fontanel, the outer extending obliquely backward from near the posterior nasal opening; sides of head and snout with vermiculating mucous pores. Middle of the fontanel over the pupil.

Eye strictly lateral, not entirely above the angle of the mouth, its center in front of the posterior end of the mandible, 2 in snout, 6–7 in head, $3\frac{1}{2}$–4 in the distance between the eyes.

Maxillary barbels thin, reaching to the middle of the pectoral or shorter, postmentals beyond base of pectorals, or sometimes not beyond edge of gill membrane; mentals to edge of gill-membrane or shorter.

Jaws about equal, the upper rather thin; teeth on the intermaxillaries villiform; the mandible with villiform teeth except the inner two or three series which are granular; like the palatine patches irregular, suboval, sometimes the anterior end, sometimes the posterior and sometimes both ends pointed.

Gill-membranes united, joined to the isthmus *without a free margin.* Gill-rakers long and slender, 4+11.

Axillary pore small; vertical series of pores present.

Distance of dorsal from snout $2\frac{2}{5}$–$2\frac{3}{5}$ in the length; the dorsal spine $1\frac{2}{5}$–$\frac{3}{5}1$ in the head, on sides and front granular, with small, sharp teeth on its inner margin; the first soft ray, little, if any, higher than the spine. Distance of adipose fin from the dorsal 3–3⅓ in the length, the fin longer than high, shorter than the dorsal fin.

Caudal fin forked, the lobes rounded, 4½ in the length.

Anal little longer than high, the highest ray 2 in the length of the head.

Ventrals short, 1⅔–2⅖ in head.

Pectoral spine long and slender, 1–⁴⁄₇1⅖ in the head, outer margin granular, inner margin with short teeth.

Ashy above, white below.

Head 3¼–3¾; depth 5–5½; D. I, 7; A. 20.

We have examined 15 specimens, the largest measuring .29 m. The sexes do not differ externally. Panama.

63. Tachisurus variolosus.

Arius variolosus Cuv. & Val. Hist. Nat. Poiss. xv, 107, 1840 (Cayenne); Günther, Cat. Fish. Brit. Mus. vol. v, 173, 1864 (copied).

Galeichthys variolosus Jordan Proc. U. S. Nat. Mus. 1886, 558 (name only).

Tachisurus variolosus Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d. Ser. vol. i, 1888, 146 (name only).

Habitat: Cayenne.

64. Tachisurus multiradiatus.

Bagrus (?) *arioides* Kner and Steindachner, SB. Ak. Wiss. Münch, 1864, 227 (Rio Bayano, Panama) (not of Cuv. & Val.)

Galeichthys arioides Jordan, Proc. U. S. Nat. Mus. 1885, 365 (name only).

Arius multiradiatus Günther, Cat. Fish. Brit. Mus, vol. v, 173, 1864 (copied); Kner & Steindachner, Abhandl. Bayr. Wiss. x, 47, 1865; Günther, Fish. Cent. Am. vi, 1866, 393 (name only).

Tachisurus multiradiatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. Vol. i, 1888, 146 (name only).

Habitat: Western slope of Panama.

65. Tachisurus hypophthalmus.

Arius hypophthalmus Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, pl. x (Panama); Jordan & Gilbert, Bull. U. S. Fish Com. 1882, 53 (Panama).

Galeichthys hypophthalmus Jordan, Proc. U. S. Nat. Mus. 1885 (name only).

Tachisurus hypophthalmus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 146 (name only).

Habitat: Panama.

66. Tachisurus gulosus.

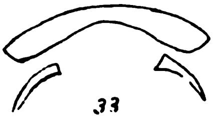
Tachisurus gulosus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 146 (Panama).

Elongate slender, the width scarcely less than the depth. Head broad, strongly depressed, the profile, to the tip of the snout nearly straight; greatest width of the head 1½ in its length; depth at base of occipital process about 2 in the length of head. Occipital process about as broad as long, obtusely keeled. Fontanel very narrow, its center above the posterior margin of the eye, continued as a groove backward. Posterior portion of the head rugose. Fontanel anteriorly margined by a bony ridge; a ridge extending obliquely between it and the eye; opercle faintly striate; sides of head and snout with reticulating canals.

Eye oblique, its center over the posterior end of the mandible and about on a level with the angle of the mouth, its diameter 2½ in snout, 8 in head, 5 in the interocular distance.

Maxillary and postmental barbels reaching to the middle of the pectoral or shorter, mental barbels to near the base of the pectoral.

Jaws subequal, very thin; the intermaxillary band of teeth very shallow in the middle; vomerine teeth none; distance between palatine patches of teeth 1½ diameters of the eye; the teeth obtusely conical, in about three series in front, in a single series behind; mandibulary band of teeth little shallower than the intermaxillary band.



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Gill-membranes united, and with a free margin. Gill-rakers 1½ times as long as the eye, 12+30.

Pectoral pore large; vertical series of pores conspicuous.

Distance of dorsal from snout 2⅓ in the length; dorsal spine rather slender, high, 1⅓ in head; distance of adipose from the dorsal fin 3½ in the length; adipose fin as high as long, its posterior margin wholly free.

Lower caudal lobe somewhat the wider, the upper lobe 1⅗–1⅘ in head.

Anal fin emarginate, the highest ray 2¾ in the head.

Ventrals truncate, 2⅖–2⅘ in head.

Pectoral spine 1⅗ in head, outer margin roughened, inner margin with recurved teeth.

Bluish gray above, silvery below; dorsal and caudal slightly dusky, other fins plain; barbels dusky.

Head 3¼; depth 5½–5¾; Br. 5; D. I, 7; A. 23.

Two specimens, ♂ .285 m. and .29 m. Panama. Steindachner.

SUBFAMILY CALLOPHYSINÆ.

X. CALLOPHYSUS.

Callophysus Müller & Troschel, Horæ Ichthyol. iii, 1, 1849 (sp.)

Callophysus Bleeker, Nederl. Tijdschr. Dierkunde i, 101, 1863 (*macropterus*).

Pimelotropis Gill, Proc. Acad. Nat. Sci. Philad. 1859, 196 (*lateralis* = *macropterus*).

Pseudocallophysus Bleeker, Nederl. Tijdschr. Dierkunde, i, 102, 1863 (*ctenodus* = *macropterus*).

Type, *Pimelodus macropterus* Lichtenstein.

This genus is distinguished by its dentition, having but one series of teeth in the lower and two series in the upper jaw. Inner series of teeth concealed or partly concealed, the teeth being much smaller than those of the outer series. The first dorsal and pectoral rays not spine-like, longer than the following rays. Adipose fin long. A wedge-shaped fontanel between the eyes, and a circular one at the base of the occipital crest.

This genus has been divided into three different genera, but the species are too suspiciously alike, and the genera are based on characters easily mistaken; so we do not feel any hesitancy in uniting the species and genera. If there are three genera, we have the anomalous fact that three closely related genera inhabit the Amazon, the species of which agree in everything but their generic characters.

67. Callophysus macropterus.

Pimelodus macropterus Lichtenstein, Wiede. Zool. Mag i, part iii, 59, 1819 (Brazil).

Callophysus macropterus Müller & Troschel in Schomburgk Brit. Guiana, 629, 1848 (Essequibo); Idem Horæ Ichthyol. iii, 1, 1849. (Brazil; Guiana); Günther Cat. Fish. Brit. Mus. 137, 1864 (copied); Peters, MB. Ak. Berl. 470, 1877, (Apure); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 120 (Obidos; Lake Jose Assu; Cameta; Rio Negro; Santarem; Tonantins; Manacapuru).

Pimelodus ctenodus Agassiz, Gen. Spec. Pisc. 21, plate viii, *a*, 1829 (Equatorial Brazil); Cuv. & Val., Hist. Nat. Poiss. xv, 186, 1840 (copied); Castelnau, Anim. Nouv. Rares de l'Amer. de Sud. 35, 1855 (Amazon).

Callophysus ctenodus Müller & Troschel, Horæ Ichthyol. iii, 2, 1849 (Brazil). ? Kner, SB. Ak. Wien, xxvi, 1857, 422 (loc.?); Günther, Cat. Fish. Brit. Mus. 137 1864 (copied).

Pimelodus insignis Schomburgk, Fish. Brit. Guiana, i, plate vi (not description).

Pimelotropis lateralis Gill, Proc. Acad. Nat. Sci. Philad. 1859, 196 (Amazon).

Callophysus lateralis Günther, Cat. Fish. Brit. Mus. 136, 1864 (copied); Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. v, 105. (Santarem; Tabatinga; Montalegre; Obidos; Rio Negro; Tonantins; Lake Manacapuru; Jose Assu); Cope. Proc. Am. Philos. Soc 17, 1878, 676 (Peruvian Amazon); Vaillant, Bull. Soc. Philom. series 7, iv, 1880 (Calderon).

Habitat: Amazon and its tributaries and northward.

We have examined 30 specimens measuring from .125 m. to .43 m. They are from Obidos; Lake Jose Assu; Cameta; Rio Negro; Santarem; Tonantins; Lake Manacapuru; Villa Bella; Serpa.

The inner ray of the ventral fins is sometimes divided to the base, accounting for the number " 7 " of the ventrals in *P. ctenodus* Agassiz.

The description of *macropterus* given by Müller & Troschel agrees with the specimens before us except in the length of the head, but the expression "bis zum Hinterhauptfortsatz" probably means "to the base of the occipital process," and not "to its tip," as Dr. Steindachner interprets it. If our interpretation is correct the measurements agree with our specimens.

Width at the origin of the dorsal fin scarcely less than the depth, the body highest at the origin of the adipose fin, gradually tapering to the caudal. The profile forms a nearly straight, oblique line from the tip of the occipital process to the posterior nostrils, thence decurved forward; sometimes depressed above the eyes.

Head rather broad, its greatest width being little less than its length in an example .43 m. long, about one-fourth less in a specimen .24 m. Top of head entirely covered with skin; very fine papillæ over the fontanel, on the back part of the head and on the shoulders.

Eye 3–4 in the snout, 2–3 in the interorbital, 7–8 in length of head.

Barbels all flattened, those of the maxillaries reaching about to the end of the adipose, or sometimes beyond the base of the caudal fin; mental barbels to or beyond the base of the pectorals, the postmentals to or beyond the base of the ventral fins. Upper jaw a little longer than the lower; teeth in two series on the intermaxillaries, the outer ones small, flattened, truncated or incisor-like, very conspicuous, the inner series of much smaller teeth so hidden by the skin as to be readily overlooked; a trenchant, bony ridge close behind the teeth on the mandible, which might be mistaken for a series of minute teeth, the inner series of the upper jaw set into a similar trenchant bone and movable in it.

Occipital process not, or scarcely meeting the dorsal plate, the process long, tapering, about twice as wide at base as at tip. Fontanel extending from posterior nasal openings to posterior margin of eye; a circular fontanel at the base of the occipital process.

First dorsal ray simple and its basal half as stiff as the "spines" of some species, but not separating into a spinous and soft portion, higher than the following rays, nearly equal to the length of the head in smaller individuals, one-fifth longer in the largest specimen, the rays evenly and rather rapidly decreasing in height backward, the last about one-third the height of the first; the tips of the dorsal reaching past the origin of the adipose fin. Adipose fin long, 2½–3 in the length.

Caudal deeply emarginate; anal emarginate, the fifth ray highest, 1⅔–1⅚ in the head.

Ventrals large, little shorter than the head.

Pectoral longer than the head in most of the specimens, the outer ray not spine-like, longest, the following rays rapidly shortening.

Color light brownish, sometimes uniform, sometimes with darker spots along the sides and on the adipose fin; other fins plain, sometimes smutty.

Head 4–4⅔; depth 5–6; Br. 8–9; D. 7; A. 12.

SUBFAMILY PIMELODINÆ.

DOUBTFUL SPECIES OF PIMELODINÆ.

67.1. *Bagrus flavicans* Castelnau, Anim. Amér. Sud, Poiss. 32, pl. xiii, fig. 2, 1855 (Amazon).

Width of body equals its depth. Head large, flat, the skull not roughened; with an angle on each side behind. Dorsal spine large, curved, striate but not serrate. Adipose fin 9⅙ in the total length. Pectoral spine large, curved, flattened, much longer than the dorsal spine, not serrated. Maxillary barbels shorter than the head. Depth 6⅔ in the total length. D. I, 6; A. 7. Uniform light yellow.. Caudal scarcely emarginate.

67.2. *Bagrus punctulatus* Castelnau, l. c. 33, pl. xiv, fig. 2.

Deeper than wide. Head with striations. Adipose 8½ in the total length; pectoral spine much longer than the dorsal spine and serrated. Eye nearer snout than to opercle. Maxillary barbels longer than the head. Anterior portion of the back with yellow spots. Caudal emarginate. Depth 4 in the total; width 6½; D. I, 6; A. 11.

ANALYSIS OF THE AMERICAN GENERA OF PIMELODINÆ.

a. Teeth on vomer none; adipose fin long or moderate; top of head covered with skin, not granulated.

b. Snout pointed, produced considerably beyond the lower jaw; dentition of both jaws weak, consisting of narrow bands of loosely-set teeth. Adipose fin long; first ray of the dorsal and pectoral fins articulated, not pungent, as long as, or longer than the following rays; dorsal and anal fins emarginate. PIMELODINA XI.

bb. Snout rather broad, scarcely produced beyond the lower jaw; teeth well developed.

c. Barbels broad and long, and having a broad membranaceous border on the posterior margins; first ray of the dorsal and pectoral fins articulated, not pungent, as long as, or longer than any of the following rays; dorsal and anal fins emarginate. Head entirely covered with skin. PINIRAMPUS XII.

cc. Barbels terete or flattened, little, if at all, margined.

d. Snout broad and produced, spatulate. First ray of the dorsal and pectoral fins articulated, not pungent; Occipital process a narrow ridge. Head entirely covered with skin; upper portion of the cheek, nasal and occipital surfaces reticulated. Dorsal and anal fins emarginate. LUCIOPIMELODUS XIII.

dd. Snout not produced.

e. Top of head entirely covered with skin.

f. Head as broad as long, or very little narrower; orbit without a free margin; occipital process reaching, or almost reaching the dorsal plate; adipose fin short. PSEUDOPIMELODUS XIV.

ff. Head longer than broad.

g. Occipital process if present, not reaching the dorsal plate.

h. Fontanel not continued behind the eye. RHAMDIA XV.

hh. Fontanel continued to base of occipital process.

i. Orbit with a free margin; dorsal placed at least partially in front of the ventrals; dorsal and pectoral with a pungent spine. RHAMDELLA XVI.

ii. Orbit without a free margin; eye small; dorsal without a pungent spine.

j. A. 18–20.

k. Caudal obliquely rounded. Heptapterus xvii.

kk. Caudal widely forked. Acentronichthys xviii.

jj. A. 8; dorsal entirely behind the ventrals. Nannoglanis xix.

gg. Occipital process narrow, reaching the dorsal plate; fontanel continued to base of occipital process, with a bridge across it, above the posterior margin of the eye. Dorsal and pectoral spines strong. Humeral process spine-like. D. I, 6. Pimelodella xx.

aa. Teeth on vomer none, or in minute patches.

l. Adipose fin longer than high. Head granulated above, naked or partially naked; occipital process usually tapering to the dorsal plate; fontanel not continued behind the eyes. Humeral process broad, not spine-like. Pimelodus xxi.

ll. Barbels compressed, ribbon-like; occipital process not reaching the dorsal plate (Gen. ? One species, *agassizii*, not seen). xxii.

lll. Adipose fin higher than long; head compressed; snout produced, pointed; occipital process reaching the dorsal plate; fontanel continued to near the occipital process. Humeral process long, spine-like. Anal rays 19 or 20. Conorhynchos xxiii.

aaa. Teeth on vomer in moderate or large patches or bands.

m. Upper jaw little, if at all, projecting beyond the lower.

n. Head more or less conical, about as high as wide. D. I, 6.

o. Top of head striate. Vomerine teeth in two separate patches which are remote from the palatine patches. Fontanel not continued behind the eyes; occipital process reaching the large dorsal plate (closely related to Pseudariodes). Bagropsis xxiv.

oo. Top of head granulated. Vomerine and palatine teeth forming a continuous band. Fontanel continued to near base of occipital process; occipital process scarcely reaching the dorsal plate. Barbels flattened. Piramutana xxv.

nn. Head broader than deep, flattened, not conical.

p. Barbels very broad, flattened, band-like. Palatine teeth none; vomer with a band of villiform teeth; jaws with very broad bands of teeth. Occipital process reaching the dorsal plate. Dorsal spine produced. Platynematichthys xxvi.

pp. Barbels not band-like.

q. Head as broad as long. D. I, 7. Upper surface of head with vermiculating ridges. Vomerine patch of teeth large, pentagonal, contiguous to the palatine patches. Occipital process large, semicircular, not meeting the reniform dorsal plate. Upper half of the adipose fin usually rayed. Phractocephalus xxvii.

qq. Head longer than broad; inner surface of gill-cover usually with one or more dermal pouches.

r. D. I, 9–10. Teeth on the vomer in two transversely ovate patches, which are sometimes united—always remote from the small palatine patches. SCIADES XXVIII.

rr. D. I, 6–8.

s. Caudal long and lanceolate, the middle rays more than ⅓ of the length; adipose fin long and low, joined to the caudal. D. 8. No evident occipital process. Dorsal placed over the ventrals. NEMUROGLANIS XXIX.

ss. Caudal forked or rounded.

t. Inner teeth of the upper jaw slender and freely movable, the band scarcely narrowed in the middle; teeth of vomer and palatines much smaller, (the palatine teeth smaller than those on the vomer), villiform. Adipose fin equal to or longer than the anal fin; caudal deeply forked, the lobes pointed. BRACHYPLATYSTOMA XXX.

tt. Teeth all similar in the upper jaw and on the vomer.

u. Head narrowed forward, its width at the mouth scarcely if any more than two-thirds its greatest width; adipose fin longer than the anal fin.

v. Upper jaw little longer than the lower. Caudal rays normal. Intermaxillary band of teeth not or scarcely narrowed in the middle. Dorsal spine equidistant from snout and middle of adipose fin.

w. Palatine patches of teeth present but very remote from the vomerine patches; vomerine patches separate in young, united in adult specimens, forming a /\-shaped patch. Caudal deeply forked, the lobes long and pointed. DUOPALATINUS XXXI.

ww. Palatine teeth present, joined to the vomerine patches, together forming a shallow band immediately behind the intermaxillary band of teeth. (Gen. ? One species, *lütkeni*, not seen.) XXXII.

www. Palatine teeth none; vomerine teeth in two transverse ovate patches which are sometimes united; intermaxillary band not narrowed in the middle. Caudal broadly rounded, or deeply emarginate. STEINDACHNERIA XXXIII.

vv. Lower jaw produced beyond upper. Intermaxillary band of teeth much narrowed in the middle. Vomerine teeth in a single patch, much wider than the intermaxillary band; palatine patches closely contiguous to the vomerine patch.

HEMISORUBIM XXXIV.

uu. Head depressed, its width at the mouth about equal to its greatest width. Adipose fin shorter than the anal; caudal forked, the rays much branched. Maxillary band of teeth much narrowed in the middle; teeth on the vomer separated on the median line, closely joined to the palatine patches, together forming, on either side, a figure somewhat like a comma. Top of head osseus; the occipital process produced, meeting or nearly meeting the dorsal plate; fontanel extending from the middle of the snout to behind the eyes and continued to the occipital as a groove. PSEUDOPLATYSTOMA XXXV.

mm. Upper jaw greatly produced.

x. Snout broad, the width at the mouth being equal to the greatest width of the head. Teeth of the upper jaw in a broad crescent-shaped patch. Barbels fleshy.

y. Head abnormally depressed, the eyes strictly lateral. SORUBIM XXXVI.

yy. Eyes superior. SORUBIMICHTHYS XXXVII.

xx. Snout long and pointed, the width at the mouth 1¼ in the greatest width of the head. Teeth of the upper jaw in a long arrow-shaped patch; palatine patches longitudinally ovate, remote from the vomerine patch. Maxillary barbels very much longer than the body. PLATYSTOMATICHTHYS XXXVIII.

XI. PIMELODINA.

Pimelodina Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. v, 101 *(flavipinnis)*.

Type: *Pimelodina flavipinnis* Steindachner.

This genus is characterized by its prolonged, subconical snout; by its dentition and by the nature of its fins.

68. Pimelodina flavipinnis.

Pimelodina flavipinnis Steindachner, l. c. 102, pl. 13, fig. 2 (Amazon near Para).

Habitat: Para.

69. Pimelodina nasus.

Pimelodina nasus Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. vol. i, 1888, 120 (Para).

Habitat: Para.

The differences between *flavipinnis* and *nasus* may be seen from the following:

flavipinnis.	*nasus.*
Maxillary barbels beyond base of caudal.	Maxillary barbels to end of adipose.
Adipose fin 2⅓ in the length.	Adipose fin 2 in the length.
Eye nearly six in head.	Eye 8 in head.
Head compressed behind the eyes.	Head not compressed behind the eyes.
Interorbital almost flat.	Head everywhere strongly convex in a cross-section.
Depth above ventrals 5⅓–5⅗ in the length.	Depth above ventrals 4⅓ in the length.
Greatest width of head 3 (?) in its length, its width between maxillary barbels 3.	Greatest width of head 1⅗ in its length, its width between maxillary barbels 3.
Eye 1⅓ in (Stirnbreite) interorbital.	Eye 2⅓ in the interorbital.
Entire upper portion of head covered with a net work.	Upper portion of head not covered with a network.
Distance of adipose from dorsal ⅓ the length of the dorsal.	Distance of adipose from dorsal equals the diameter of the eye.
Pectoral lower than the dorsal.	Pectoral higher than the dorsal (damaged) equal to the head.
Upper half of body reddish-brown.	Caudal lobes equal, longer than the head.
Lower half of body yellow.	
Several rows of brown spots on upper half of body.	A dark humeral area, otherwise plain yellow.
Length to base of caudal .267 m.	Length to base of caudal .34 m.

Elongate fusiform, the back compressed, trenchant; width, above the ventrals, 1⅗ in the greatest depth. Head short, flat below, regularly convex above; profile very steep and almost straight. The thick skin obliterates the outlines of all the bones. Occipital process long and narrow, not reaching half way to the first dorsal ray, not to the dorsal plate.

Eye small, its anterior margin equidistant from the snout and the free border of the opercle; its diameter 4 in the snout, 8 in the head, 2½ in the interocular.

Posterior nasal opening a transverse slit.

Maxillary barbels reaching to the end of the adipose fin, or longer; mental and postmental barbels inserted in a straight line, the mentals reaching beyond base of the pectorals, the postmentals beyond their tips.

Mouth entirely inferior, the snout projecting beyond it farther than one diameter of the eye; lower jaw weak, the teeth scarcely evident, in a very narrow band; the teeth of the upper jaw in a somewhat wider band.

Gill-rakers 7+17.

Distance of dorsal fin from the snout 3½ in the length; first dorsal ray high and slender, scarcely spinous, the free margin of the fin straight. Adipose fin beginning immediately behind the dorsal, its base 2 in the length.

Caudal deeply forked, the lobes of equal length, longer than the head.

Fourth anal ray highest, higher than the fin's base, 2 in the length of the head.

Ventrals inserted little nearer to the anal than to tip of the snout, 1⅕ in the head.

First pectoral ray scarcely spinous, slight serrations on its inner margin, about as long as the head.

Axil and humeral region blackish, otherwise uniform yellowish.

Head 5⅓; depth 5⅗; depth of peduncle 13; Br. 9; D. 7; A. 12.

XII. PINIRAMPUS.

Pinirampus Bleeker, Ichth. Arch. Ind. Siluri, 198, 1858 *(pinirampu);* id. Nederl. Tijdschr. Dierkunde, i, 100, 1863 *(typus=pirinampu).*

Pinirampus Günther, Cat. Fish. Brit. Mus. v, 135, 1864 *(typus=pirinampu).*

Type: *Pimelodus pirinampu* Spix.

This genus is characterized chiefly by its barbels which are broadly margined by a membrane.

70. Pinirampus pirinampu.

Pimelodus pirinampu Spix, Gen. et Spec. Pisc. Bras. 20, pl. viii, 1829 (Brazil); Schomburgk, Fishes Guiana, part i, 183, 1841 (Guiana); Castelnau, Anim. Amér. Sud, Poiss. 35, 1855 (Amazon).

Pinirampus pirinampu Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 121 (Cameta).

Pimelodus pirinampus Cuv. & Val. Hist. Nat. Poiss. xv, 196, 1840 (Brazil); ? Kner, SB. Ak. Wien, xxvi, 1857, 416 (loc.?).

? *Pimelodus barbancho* Humboldt, Rec. Obs. Zool. ii, 172, 1833 (Venezuela).

Pinirampus typus Bleeker, Nederl. Tijdschr. Dierkunde, i, 100, 1863 (name only).

Pirinampus typus Günther, Cat. Fish. Brit. Mus. v, 135, 1864 (copied).

Habitat: Rio Tocantins to Venezuela.

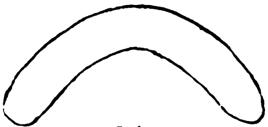
From Dr. Steindachner's statement that his *Pinirampus agassizii* differed from *pirinampu* Kner only in having the postorbital portion of the head granulated, we judge that the specimens mentioned by Kner, l. c. (which Steindachner had for comparison) were not the *pirinampu* Ag., for the specimen figured by Steindachner as *agassizii* is wholly unlike and generically distinct from specimens which agree in all respects with Agassiz's description of *pirinampu*.

Two specimens .455 m. and .38 m. long, collected by Professor Louis Agassiz at Cameta.

Body elongate, compressed to a ridge above, the caudal peduncle subcylindrical. Head depressed above the eyes, and forward to the posterior nasal openings, the profile rather steep from the occipital crest to the posterior margin of the eyes, thence less inclined, again decurved from the posterior nostrils forward, the tip of the snout convex, the upper jaw little longer than the lower; the greatest width of the head (from opercle to opercle) one-fifth greater than the depth at base of the occipital process, and $1\frac{1}{4}$ in its length; its width at the angle of the mouth $1\frac{3}{4}$–$1\frac{4}{5}$ in its length. Fontanel not continued behind the eye, but a groove extends to the occipital process. Occipital process very narrow, extending to near the dorsal plate.

Eye small, its center behind the middle of the head, its diameter 3½–4 in the snout, 7½–9 in head, 2½–3 in the interorbital.

Maxillary barbels extending to, or nearly to the anal, mental barbels to the middle of the ventral fin, postmental about as long as the maxillary barbels, all the barbels flattened and margined posteriorly, with a broad membranaceous border.



34.

Mouth wide, the gape extending more than half way to the eye; teeth of both jaws very minute, those of the mandible in a band one-half as deep as the diameter of the eye, interrupted in the middle; a strongly arched band of teeth in the upper jaw, seven times as wide as deep. Branchiostegal membranes separate to in front of the rictus; gill-rakers 7+17. Distance of the first dorsal ray from tip of snout 3¼–3⅖ in the length. First dorsal ray not pungent, continued in a filament, which is equal in height to its distance from the snout, the rays rapidly decreasing in height, the last ray one-third the length of the first divided ray.

The distance of the adipose fin from the dorsal equals less than one-half the length of the latter.

Adipose fin 2⅓–2½ in the length.

Caudal lunate in the smaller specimen, the longest rays being shorter than the head; 4½ in length of body; deeply forked in the larger specimen, the longest rays being one-third longer than the head, 3⅗ in the length.

Free margin of the anal emarginate, the third ray extending beyond the tips of the last; more than half the length of the head.

Ventrals inserted behind the vertical from the last dorsal ray, 1⅓–1 in the head.

Pectoral spine longer than any of the other rays, flexible and flattened, roughened in front, with straight teeth along its inner margin.

Color silvery below, light brown above.

Head 4⅔–4⅓; depth 5; depth of caudal peduncle 11½; Br. 9; D. I, 6; A. 11.

XIII. LUCIOPIMELODUS.

Luciopimelodus Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. vol. i, 1888, 122 (*pati*).

Type: *Pimelodus pati* Valenciennes.

First dorsal and pectoral rays not spinous, flexible and longer than any of the succeeding rays. Free margins of the dorsal and anal emarginate. Barbels scarcely margined. Head depressed. Snout elongate and spatulate. Fontanel continued to above the eye, a circular depression at base of occipital process. Occipital process narrow, not touching the dorsal plate.

ANALYSIS OF THE SPECIES OF LUCIOPIMELODUS.

a. Dorsal plate present, concealed under the thick skin. Adipose fin 3–4 in the length, equal to its distance from the first dorsal ray or from the occipital process. Upper jaw projecting beyond the lower for not more than ½ the diameter of the eye. Eye 11 in head. *pati* 71.

aa. No dorsal plate (pre-dorsal scute). Adipose fin 4½ in the length, equal to its distance from the fifth dorsal ray. Upper jaw much projecting beyond the lower. Eye 9 in head. Head covered with thin skin above, occipital process narrow. Maxillary barbels extending to the origin of the adipose fin, postmentals beyond the base of the pectorals. Eye nearly median. Caudal fin deeply forked. Coloration uniform. Head little less than 4 in the length. D. I, 6; A. 12 (Günther). *platanus* 72.

71. Luciopimelodus pati.

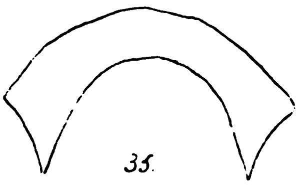
Pimelodus pati Valenciennes, Voy. d'Orbigny. pl. i, figs 7–9, 1847. Cuv. & Val., Hist. Nat. Poiss. xv, 176, 1840 (Parana; La Plata; Corrientes; Buenos Ayres); Kner. SB. Ak. Wien, xxvi, 1857, 416 (Forte de S. Joaquim, Rio Branco); Günther, Cat. Fish. Brit. Mus. v, 128, 1864 (copied).

Luciopimelodus pati Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 122 (Buenos Ayres).

Habitat: Pio Plata; Rio Branco near British Guiana.

Width below the first dorsal spine less than the depth, tapering to a slender caudal peduncle. Head wide, its width 1⅔ in its length; snout elongate, depressed, spatulate, its width at the rictus 2 in length of head; upper half of cheek, nasal and occipital regions covered with reticulated skin. Occipital process a mere ridge.

Eye behind the middle of the head, 5½ in snout, 11 in head, 2⅔ in interorbital, 3¾ diameters behind the rictus; mouth large, the upper jaw slightly projecting; width of the mandibulary band of teeth equal to the diameter of the eye; intermaxillary band of teeth deepest at the outer edges which are emarginate.



35.

Maxillary barbels somewhat compressed, reaching to tips of ventrals or beyond region of anal; mentals inserted almost directly in front of the postmentals, reaching beyond base of pectoral; postmentals beyond base of ventrals.

Gill-rakers short, scarcely overlapping, 4+13.

First dorsal ray slender, articulated on its upper half, but not branched, longer than the following rays, 1⅕ in head; dorsal rays rapidly decreasing in height to the last, which is less than one-half as high as the first. Adipose fin 3¼–4¼ in the length.

Caudal deeply forked, both lobes long and pointed, about equal to the head in length.

Free margin of anal emarginate, the fourth ray highest, 2⅕ in head.

Ventrals inserted behind the vertical from last dorsal ray, 1⅗–1½ in the head.

First pectoral ray similar to the first dorsal ray, with short teeth on its posterior margin, not shorter than the longest ray, reaching a little beyond base of ventral in the larger specimen, 1⅛ in head.

Color light brown, silvery below, with dark spots along sides of body; a dark streak forward from eye; tips of dorsal dusky.

Head 4; depth 7; Br. 9 or 10; D. 7; A. 12.

Fourteen specimens; Buenos Ayres.

72. Luciopimelodus platanus.

Pimelodus platanus Günther, Annals Nat. Hist. (5) vi, 10, 1880 (Parana, Rio Plata).

Habitat: Rio Plata.

This species is known only from the types.

XIV. PSEUDOPIMELODUS.

Pseudopimelodus Bleeker, Ichthol. Arch. Ind. Siluri, 196, 1858 (sp.); id., Nederl. Tijdschr. Dierkunde, i, 1863 (*bufonius=zungaro*).

Batrachoglanis Gill, Ann. Lyc. Nat. Hist. N. Y. 1858 (*raninus*).

Zungaro Bleeker, l. c. 101, 1863 (*zungaro*).

Lophiosilurus Steindachner, SB. Ak. Wien, lxxiv, 1876. Ichthyol. Beitr. v, 106 (*alexandri*).

Type: *Pimelodus raninus* Cuv. & Val.

Eye covered with skin; orbit without a free margin; dorsal plate well developed, usually joined to the occipital process. Head broad, depressed. Dorsal and pectoral spines well developed. Caudal rounded or emarginate.

Habitat: Region between the Rio Plata and Rio Magdalena.

ANALYSIS OF THE SPECIES OF PSEUDOPIMELODUS.

a. Head very large; very much depressed, flat; mouth oblique; lower jaw projecting. (LOPHIOSILURUS).

b. Top of head flat. Occipital process meeting the dorsal plate. Width of head little less than its length. Eye minute. Snout 5½ in head. Intermaxillary band of teeth turned back at the outer edges. Maxillary and postmental barbels reaching to the posterior margin of the orbit. Adipose fin 3 in head. Pectoral spine serrate on both margins Caudal rounded. Dorsal fin short. Light brown with darker markings. Head 3; D. I, 6; A. 11. *alexandri* 73.

aa. Head moderate, not greatly depressed; teeth villiform.

c. Intermaxillary band of teeth without a backward projecting angle. (BATRACHOGLANIS).

d. Dorsal plate longer than the occipital process. Serration of the pectoral spine strongest on its inner margin. A light bar across the nape from base of pectoral to base of pectoral. *parahybæ* 74.

dd. Dorsal plate as long as the occipital process.

e. Inner and outer margins of the pectoral spine with equally strong teeth. Head at least as broad as long. Eye oval. Maxillary barbels reaching to near tip of the pectoral, or shorter. Caudal rounded. Brown, marbled with darker; no distinct cross bands; dorsal, adipose and anal fins blackish-brown with margins of white, the dorsal sometimes with a light cross band near its base; caudal dotted with black, and having, at its tip, a black band which is sometimes edged with white. The markings variable. Head 3¾; D. I, 6; A. 10–11 (compiled). *raninus* 75.

ee. Inner margin of pectoral spine much more strongly serrated than the outer margin. Head slightly longer than broad, naked above; occipital process short, about equal to dorsal plate, contiguous to it. Maxillary barbels reaching base of pectoral, the postmentals a little shorter. Eye very small, directed upwards, covered with skin. Intermaxillary band of teeth of moderate breadth, without prolonged lateral portion. Dorsal fin a little higher than long, with strong serrated spine. Length of adipose fin equals about three-fourths its distance from the dorsal. Pectoral spine very stout, depressed. Caudal forked. Pale brownish; head dotted with brown; a wide dark brown band encircling body and covering dorsal fin to a broad margin which is white; tail and caudal dark brown, a large light spot on each side the peduncle (sometimes confluent); two large white spots near base of caudal, tip of the fin whitish; adipose fin dark brown, whitish in front and behind; pectoral and ventral with one, anal with two dark brown cross bands. Head 3½; depth 5–9; D. I, 6; A. 9 (Boulenger). *pulcher* 76.

cc. Intermaxillary band of teeth with a backward projecting angle. (PSEUDOPIMELODUS.)

f. Teeth of the pectoral spine all short, those of the outer margin straight or retrorse, the spine blunt at the end. Depth of the intermaxillary band of teeth at the middle 3–4 in its width. Outer margin of the dorsal spine with recurved notches, the inner margin with short recurved teeth. Dorsal I, 6 or 7. *zungaro* 77.

ff. Teeth of the pectoral spine scarcely shorter than the width of the spine, those of the outer margin extrorse, those on the inner margin retrorse; the spine ending in a sharp point. Depth of the intermaxillary band of teeth near the middle 6 in its width. Anterior margin of the dorsal spine without notches, but with teeth which are straight or point toward the tip, the inner margin smooth. *acanthochira* 78.

73. Pseudopimelodus alexandri.

Lophiosilurus alexandri Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. v, 106, pl. xv (? Amazon).

Pseudopimelodus agassizii Steindachner, Fisch-Fauna des Cauca and Flüsse bei Guayaquil, 9, 1880 (name only).

Habitat: Rio San Francisco.

One specimen .24 m. Januaria.

74. Pseudopimelodus parahybæ.

2. *Pseudopimelodus charus* Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische Südöstl. Bras. iii, 74 (Rio Parahyba; Santa Cruz).

Pseudopimelodus parahybæ Steindachner, Fisch-Fauna des Cauca & Flüsse bei Guayaquil, 8, 1880, pl. i, figs. 2-2*b* (Rio Parahyba; Santa Cruz); Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. vol. i, 1888, 122 (Santa Cruz).

Habitat: Rio Parahyba north to the Rio Doce.

This species resembles very closely in color *Pseudopimelodus acanthochira* Eigenm. & Eigenm.

Width behind humeral process about equal to the depth, tapering to the caudal peduncle. Head depressed, about as wide as long, somewhat flattened above. Fontanels as in *bufonius*. Occipital process meeting the much longer dorsal plate. Head with large round pores. Eye very small. Width of mouth at the angles more than half the length of the head. Intermaxillary band of teeth very narrow, without a backward projecting angle.

Humeral process strong, about reaching the middle of the pectoral spine. Distance of dorsal spine from tip of snout 2½ in the length, the spine smooth in front, about 2 in head. Distance of the adipose from the dorsal fin longer than the base of the dorsal, about as long as the adipose.

Caudal slightly emarginate, about as long as the head. Tips of anal rays reaching to the caudal.

Pectoral spine stout, longitudinally striate, with very strong and long recurved teeth on the inner margin, minute teeth on the anterior margin.

Color brown; a light scalloped band on opercles extending across the nape, the band margined with white; usually a light spot under the dorsal spine, and a light band across the back immediately behind the dorsal fin, extending horizontally along sides, meeting again across caudal peduncle; dorsal fin sometimes uniform brown, but usually with a light bar on the center of the last four rays; base of caudal dark, the tips dusky, light between, dotted with darker; anal spotted with light and dark, a black spot at the base of the anterior rays.

Head $3\frac{1}{2}$–$3\frac{2}{5}$; depth $5\frac{1}{2}$–6; D. I, 6; A. 10–11.

The very numerous examples examined are from Santa Cruz.

75. Pseudopimelodus raninus.

Pimelodus raninus Cuv. & Val. Hist. Nat. Poiss. xv, 157, 1840 (Mana; Rio Janeiro); Kner, SB. Ak. Wien, xxvi, 1857, 421 (Barra do Rio Negro; Guaporé; Matogrosso); Günther, Cat. Fish. Brit. Mus. v, 133, 1864 (Essequibo).

Pimelodus (Pseudopimelodus) raninus Peters, MB. Ak. Berl. 1877, 470 (Apure).

Pseudopimelodus raninus Steindachner, Flussfische Südamerika's iv, 4, 1883 (Rio Huallaga).

Habitat: Rio Janeiro to Essequibo; Rio Huallaga and Matto Grosso.

This species is known to us only from descriptions.

76. Pseudopimelodus pulcher.

Pimelodus (Pseudopimelodus) pulcher Boulenger, Proc. Zool. Soc. London, March 1887, 276, plate xxi, fig. 1 (Canelos).

Habitat: Eastern Ecuador.

This species is known only from the types.

77. Pseudopimelodus zungaro.

Pimelodus zungaro Humboldt, Obs. Zool. ii, 170, pl. xlvi, fig. 1, 1833 (Marañon); Cuv. & Val. Hist. Nat. Poiss. xv, 160, 1840 (copied); Schomburgk, Fish. Guiana, ii, 205, 1843 (Tomependa, Amazon).

Pseudopimelodus zungaro Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. vol. i, 1888, 122 (Goyaz).

Pimelodus bufonius Cuv. & Val. Hist. Nat. Poiss. xv, 155, 1840 (Cayenne); Kner, SB. Ak. Wien, xxvi, 1857, 421 (Cujaba); Günther, Cat. Fish. Brit. Mus. v, 133, 1864 (Rio Cipo tributary to the Rio das Velhas); Cope, Proc. Am. Philos. Soc. 17, 1878, 675 (Peruvian Amazons); Steindachner, Fisch-Fauna des Cauca and Flüsse bei Guayaquil, 7, pl. ii, figs. 1-1b. (Cauca).

Pimelodus charus Cuv. & Val. Hist. Nat. Poiss. xv, 159, 1840 (Rio Sabara).

Pseudopimelodus charus Lütken, Dan. Selsk. Skr. 1875, 180 (Rio das Velhas).

Pimelodus mangurus Valenciennes, Voy. d'Orbigny, pl. i, figs. 4-6, 1847 (Rio Plata); Cuv. & Val. Hist. Nat. Poiss. xv, 156, 1840 (Brazil; Paraguay); Günther, Cat. Fish. Brit. Mus. v, 134, 1864 (copied).

Zungaro humboldtii Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 101 (name only).

Habitat: Rio Plata, Rio Magdalena and the region between.

We have examined four specimens of this species collected by Senhor Honorio at Goyaz. They measure .12, .14, .20, and .21 m. respectively, to the base of the caudal fin. One of these specimens has 7 dorsal rays and represents *mangurus*. Thus, like several species of *Rhamdia* the southern representatives of this species are seen to be liable to have more rays. The two forms, *mangurus* and *bufonius*, cannot be separated.

There can be little doubt but that *Pimelodus zungaro* is identical with *P. mangurus*. The head and adipose fin of *zungaro* are shaped as in a *Pseudopimelodus;* the eye is small and placed well forward. The dorsal and pectoral spines of *mangurus* are short, with a long, flexible prolongation and the skin covering them very thick, accounting for the statement that *zungaro* has no spiny rays. The ventral rays of *mangurus* are divided for more than half their length and the basal portion covered with very thick skin; unless the skin is removed, the rays, in large specimens, would appear to be more, rather than fewer than ten, the number stated by Humboldt. *Mangurus* is covered with spots which are smallest on the head; if then, we attribute to the personality of the artist the regularity of the spots in the figure of *zungaro* the identity of that species with *mangurus* must be conceded.

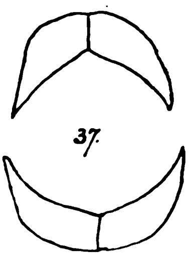
Width behind the head decidedly greater than depth, the body wedge-shaped, compressed at the caudal. Head as wide as long; frontal reduced to a very narrow slit between the frontal bones above the eyes; occipital process short, deeply notched at the tip, receiving the point of the much longer dorsal plate.

Profile straight, nearly horizontal.

Eye small; distance from the anterior edge of the eye to the tip of snout 3 in head, distance between the eyes 2 in head.

Maxillary barbels not as long as the head; mental barbels reaching to the base of postmentals which extend to the edge of the branchiostegal membrane, or shorter.

Jaws sub-equal; intermaxillary band of teeth very wide, its depth at the symphysis 3–4 in its width, the teeth all villiform, the inner ones slightly longer; mandibulary band of teeth very deep in front, tapering to a point backward, the widest part equal at least to 2 diameters of the eye.



37.

Humeral process very oblique, scarcely projecting beyond the arch.

Distance of dorsal spine from tip of snout 2⅘–3 in the length.

Dorsal spine perfectly straight, 2–2½ in head, the entire anterior margin with recurved notches; the posterior margin with fine recurved teeth; the soft rays broken in the specimens.

Distance of the adipose fin from the dorsal fin 1½–1⅔ times as long as the base of the dorsal. Adipose fin little longer than the dorsal fin.

Tips of anal extending to the base of the caudal fin, beyond the vertical from tip of adipose fin.

Ventrals inserted little or not at all behind the vertical from last dorsal ray, the rays divided for about half their length giving the appearance of having 10 or more rays.

Pectoral spine scimitar-shaped, very blunt and broader at tip than at base, its inner margin with numerous short, blunt teeth near its tip; outer margin with similar teeth on its upper two-thirds, the basal third with longer, pointed, recurved teeth; in the adult the teeth become more or less obliterated; the spine is hollow, open at the tip, a flexible prolongation of the spine nearly as long as the spinous portion of the ray, which remains after the leathery "skin" of the spine is removed.

The specimens are mutilated, the fins having their soft portions broken and the color washed out, except traces of small dark brown spots on top of the head in the larger specimen.

Head 3¾; depth 5¾–6¾; depth of peduncle 7½–8½; Br. 8–9; D. I, 6 in the smallest, I, 7 in the three larger specimens; A. 9–10.

78. Pseudopimelodus acanthochira.

Pseudopimelodus acanthochira Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. i, 122, 1888, (Gurupa; Tajapuru; Teffé; Jutahy).

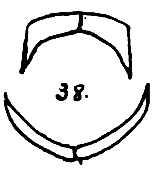
Habitat: Amazon from Para to Tabatinga.

Depth behind the humeral process less than the width, tapering to the caudal peduncle. Head depressed, as wide as long. Frontal fontanel not continued behind the eye; an elongate occipital fontanel. Occipital process short, but meeting the longer dorsal plate. Large round pores on the head, most numerous on the snout and chin.

Eye small, 2½ in the snout, 8½ in the head, 3 in the interorbital.

Barbels all short, those of the maxillaries extending little, if any, beyond middle of the pectoral fin.

Mouth more than half as wide as the length of the head; intermaxillary band of teeth with a sharp, backward projecting angle; mandibulary band of teeth shallower than the intermaxillary band, about as deep as one diameter of the eye, scarcely deeper in front than at the sides.



38.

Humeral process almost horizontal, strong, triangular, not reaching to the middle of the pectoral.

Distance of the dorsal spine from end of snout 2⅓ in the length. Dorsal spine toothed on the outer margin, stout, 2 in head, the rays higher, nearly uniform. Distance of the adipose fin from the dorsal longer than the length of the dorsal. Adipose about as long as the dorsal fin.

Caudal fin long, scarcely shorter than the head, rounded.

Anal fin beginning and ending a little in front of the anterior and posterior ends of the adipose; the tips of the anal rays extending to the base of the caudal when laid back.

Ventrals inserted under the vertical from the last dorsal ray, 1½–1⅗ in the head.

Pectoral fin extending to the ventrals in young, much shorter in adult specimens; the spine 1½ in the head, not much shorter than the longest ray, very much depressed, the teeth equally strong and long on the inner and outer margins of the spine, those on the outer margin pointing toward the tip, on the inner margin toward the base.

Abdominal region sometimes covered with small papillæ; anterior portion of the lateral line with larger papillæ or short tentacles. Lateral line sometimes not extending to the caudal fin.

Chocolate color; head faintly marked with lighter; a zig-zag light bar from the gill-openings across the nape; dorsal dark brown, a short transparent bar on the lower half of the last four dorsal rays; base and posterior third of the caudal dark brown, the intermediate region transparent, with dark mottlings; anal dark brown, margined with white, and a white bar on the lower half of the last five rays; ventrals and pectorals dark brown.

Head 3¼; depth 5; Br. 8 or 9; D. I, 6; A. 10.

No. 8133, one specimen .063 m. Gurupa.

No. 8157, one specimen .045 m. Tajapuru.

No. 7732, two specimens .093 m. and .114 m. Teffé, collected by Professor Louis Agassiz.

No. 7332, one specimen .12 m. Jutahy. Thayer Expedition.

XV. Rhamdia.

Pimelodus Lacépède, Hist. Nat. Poiss. v, (sp.)

Pimelodus Cuvier, Règne Animal, 1817 (sp.)

Pimelodus Günther, Cat. Fish. Brit. Mus. v, 1864 (sp.)

Pteronotus Swainson, Hist. Fish. Rept. Amph. ii, 309, 1839 (5-*tentaculatus*) preoccupied in Mollusks.

Rhamdia Bleeker, Ichthyol. Arch. Ind. Siluri. 197, 1858 (sp.)

Rhamdia Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 101 (*queleni*).

Pimelonotus Gill, Ann. Lyc. Nat. Hist. N. Y. iv, 391, 1859 (*vilsoni*).

Notoglanis Günther, Cat. Fish. Brit. Mus. v, 136, 1864 (*multiradiatus*).

Type: *Pimelodus quelen* Quoy & Gaimard.

The name *Rhamdia* seems to be the oldest available name for this genus. *Notoglanis* can scarcely be separated on account of its ten dorsal rays as *quelen* and *sapo* sometimes have eight rays and *hilarii* occasionally has nine.

Undoubtedly on account of insufficient descriptions some species have been placed here which ought to be placed in *Rhamdella.* The young of these species usually have the fontanel extending to the base of the occipital process with a bridge behind the eye and another in front of the occipital bone. The occipital fontanel sometimes remains in the adult as a shallow pit from which the ridges of the posterior portion of the head radiate. The postfrontal fontanel usually disappears entirely and in one specimen of *quelen* the frontal fontanel had also disappeared.

Habitat: Rio Plata to Mexico and Western Peru.

DOUBTFUL SPECIES OF RHAMDIA.

78.1. *Pimelodus velifer* Humboldt, Observ. Zool. ii, 171, 1805 (Magdalena River). The substance of the description is: Elongate; adipose dorsal covering the whole median part of the body. D. 7; A. 10; V. 6.

78.2. *Pimelodus argentinus* Humboldt, l. c. 171, 1805 (Magdalena River near Chilloa). White; back bluish. Maxillary barbels ⅔ as long as the body. D. 7; V. 5; pectoral and dorsal spines not serrated. 16 inches long.

78.3. *Laukidi* Schomburgk, Fish. Brit. Guiana, i, 176, 1843. *Rhamdia laukidi* Bleeker, Ichthyol. Arch. Ind. 208, 1858 (copied). Body blue-black; belly whitish, finely spotted with black. Eyes placed in middle of head. Teeth a fine series, thickly set in both jaws. Ventrals midway between pectorals and anal. Air bladder heart-shaped. Reaches a length of 18–20 inches. D. 7; A. 9; Br. 8.

78.4. *Pimelodus grunniens* Humboldt, Rec. Observ. Zool. 127, 1833 (Orinoco). Olivaceous above, spotted with black; white below. Head obtuse truncated, 4 in length of body; body compressed. All fins except caudal olivaceous, margined with red. Adipose dorsal small; barbels 6. The plaque of the neck large. Pectoral fins longer than the others. The Indians call it "Carxaro." 2 feet 2 inches.

ANALYSIS OF THE SPECIES OF RHAMDIA.

a. Occipital process and fontanel wanting. (?)

b. Dorsal fin more than twice as high as long, the first ray highest. Snout somewhat pointed; eye 5 in head, less than 2 in the interocular, more than 2 in snout; posterior nasal opening nearer edge of mouth than to the eye. Upper jaw somewhat the longer. Maxillary barbels reaching anal, postmentals to last third of the pectoral fin. Dorsal spine smooth, ending in a filament; adipose fin very long; pectoral spine flattened, its inner margin serrated, teeth near tip of its outer margin, reaching to below beginning of the dorsal; a small pectoral pore. Caudal deeply forked, the upper lobe somewhat longer, 5 in the length. Uniform brown. Head 6⅓ in the total length. D. I, 6; A. 12. (Kner.) *breviceps* 79.

aa. Occipital process present.

c. Fontanel not continued behind the eye in the adult;* sometimes a small round fontanel at the base of the occipital process. (RHAMDIA.)

d. Mandible projecting beyond the intermaxillary.

e. Head depressed. Dorsal and pectoral spines serrated. Opercle striated. Adipose fin very large; vent about the middle of body. Bluish-green with lighter spots; nearly white on belly and lower part of head. D. I, 6; A. 12; Br. 8. (Schomburgk.) *schomburgkii* 80.

ee. Caudal portion of the body considerably deeper than the abdominal. Eye 2 in the interocular. Maxillary barbels extending beyond the caudal, postmentals to below middle of dorsal fin. Dorsal spine very slender, smooth, shorter than the pectoral spine; adipose fin 4.3 in the length; pectoral spine finely serrated on both edges, as long as the snout and half the orbit; supra-occipital process six times as long as wide, not reaching to the basal bone of the dorsal spine. Head 3⅓ in the length; depth of caudal portion of body $6\frac{3}{10}$; D. I, 6; A. 9. (Cope.) *bathyurus* 81.

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*Not examined in *schomburgkii*, *bathyurus*, *foina*, *humilis*, *cinerascens*, *pentlandi*, *multiradiatus*, *longicauda*, *dorsalis*.

dd. **Jaws equal, or the upper jaw longer.**

f. **Intermaxillary band of teeth of about equal depth throughout.**

g. **No dark lateral band.**

h. **Pores on the head not aggregated, or at most, 3 in a place; D. I, 6, except sometimes in *quelen*.**

i. **Maxillary barbels extending beyond middle of adipose fin in the adult.**

j. **Vent midway between the bases of caudal and pectoral fins; depth above first anal ray 4½ in the length; depth of caudal peduncle 8 in the length; base of anal oblique. Maxillary barbels extending beyond base of caudal fin.**

***obesus* 82.**

jj. **Vent midway between base of caudal fin and eye. Body rather elongate; depth above first anal ray about 6 in the length. Eye smaller, about 7 in length of the head.**

***sebæ* 83.**

jjj. **Eye large, 3⅓ (in young)—6 in the head.**

***sebæ kneri* 83a.**

ii. **Maxillary barbels not extending to middle of adipose fin in the adult.**

k. D. I, 5–8.

l. Adipose fin 3½–4 in the length.

m. Eye situated in the middle of the head. Interocular equal to one-half diameter of eye. Posterior nasal opening nearer eye than to the snout. Head flat, the eyes superior; occipital process very short. Maxillary barbels reaching tips of pectoral fins; postmental barbels to base of pectorals. Dorsal spine little more than half as high as the rays; adipose fin originates above tips of ventrals, twice as long as the dorsal fin; caudal forked, upper lobe longer than the lower; anal under middle of adipose; pectoral spine strongly serrated, especially along its outer margin. Head more than 5 in the total length. Br. 6; D. I, 6; A. 11. (Müller & Troschel.)

***foina* 84.**

mm. Eye in the anterior half of the head.

n. Distance of adipose from dorsal fin equals ⅔–¾ its own length. Maxillary barbels extending on to root of ventrals; intermaxillary band of teeth 8 times as wide as deep; eye 2–3 in interocular, 6 in head; the eye occupies the third sixth of the head. Pectoral spine 2½ in head, slightly serrated along both edges; caudal fin cleft to the base, the upper lobe more pointed than the lower. Head 4⅔ in the length; depth 6½; D. I, 6; A. 12. (Günther.)

***humilis* 85.**

nn. Distance of adipose from dorsal fin equals ¼ its own length. Maxillary barbels extend nearly to origin of adipose fin; intermaxillary band of teeth 5–6 times as wide as deep; eye 2½ in the interocular. Pectoral spine less than half as long as the head. Head 4 in the length; depth about 5. Br. 7; D. I, 6; A. 13. (Günther.) *cinerascens* 86.

nnn. Distance of adipose from dorsal fin scarcely less than the length of the adipose. Maxillary barbels extending to base of ventrals; intermaxillary band of teeth 7 times as wide as deep; eye 2½ in the interocular; pectoral spine two-fifths the length of the head, serrated along both edges. Head 4 in the length; depth 5⅔; D. I, 6; A. 12. (Günther.) *pentlandi* 87.

ll. Adipose fin 2⅔–3½ in the length; D. I, 6–8. *quelen* 88.

kk. D. I, 10. Head granular (in dried specimens), its width not much less than its length. Snout semicircular. Eye in middle of head, 2½ in the interocular, 6 in the head. Maxillary barbels reach to the anal; postmentals to below dorsal fin. Dorsal rays subequal in height, the spine with longitudinal furrows, without serration; pectoral well developed, the spine almost as long as the rays, roughened in front, serrated behind; caudal deeply forked, the upper lobe longer; adipose fin one-third longer than the dorsal fin. Brownish with lighter marbling. Head 5 in the total length. A. 10. (Kner.) *multiradiatus* 89.

hh. Pores on the head aggregated in several places or not. D. I, 7–8. Intermaxillary band of teeth about 4 times as wide as deep. *sapo* 90.

hhh. Pores on the head aggregated in several places; the most conspicuous groups are between the eyes and on lower part of opercle. D. I, 7–9. Intermaxillary band of teeth about 7 times as wide as deep. *hilarii* 91.

gg. A dark lateral band. Maxillary barbels not extending much beyond beginning of adipose fin. Pectoral spine short, about half as long as the head; top of head flat. *wagneri* 92.

ff. Intermaxillary band of teeth deeper at the outer edges.*

o. Head 6 in the length; depth 9–10. Dorsal spine nearer origin of anal than to tip of snout, the last dorsal ray nearer snout than to end of adipose fin; dorsal fin higher than long, the spine very weak. Adipose fin about 3½ in the length. Lower jaw shorter; intermaxillary band of teeth about 4 times as wide

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*Young of *sapo* 90.

as deep; eye equidistant between end of snout and gill-opening. Pectoral spine very feeble, not striate. Head naked above; occipital process short, widely separated from the dorsal spine. Maxillary barbels extend to base of ventrals, postmentals to base of pectorals. Depth of body above the anal equals the depth below the dorsal; caudal peduncle as deep as its free portion (behind adipose) is long; caudal fin deeply forked, upper lobe much produced, more than one-fourth of the total length. Brownish above, whitish below. Total length .175 m. D. I, 6; A. 10. (Boulenger.) *longicauda* 93.

oo. Head 4–4½ in the length.

p. Adipose fin between 3 and 4 in the length.

q. Head three-fourths as wide as long; occipital process moderate; eye in anterior portion of the head, 8 in its length, its distance from the snout equals the interocular; depth of intermaxillary band of teeth more than one-sixth of its width. Maxillary barbels reach to or beyond middle of ventrals. Head 4 in the length; depth about 5; depth of caudal peduncle 11. Br. 6; D. I, 6; A. 9. (Gill.) *dorsalis* 94.

qq. Inner margin of pectoral spine with strong teeth its entire length, outer margin smooth or slightly roughened near the base; vent equidistant between base of caudal and base of pectoral spine; a dark lateral band; adipose fin 3½ in the length; maxillary barbel reaching to below the anterior half of the dorsal. Anal rays 13. *poeyi* 95.

pp. Adipose fin 2½ in the length. Inner margin of pectoral spine roughened on its basal half, thence deeply grooved to the tip, outer margin with strong recurved notches on its upper two-thirds; vent much nearer to base of pectoral than to the caudal fin; no dark lateral band; maxillary barbel reaching beyond base of ventrals. *tenella* 96.

79. Rhamdia breviceps.

Pimelodus breviceps Kner, SB. Ak. Wien, xxvi, 1857, 418 (Marabitanos); Günther, Cat. Fish. Brit. Mus. v, 122, 1864 (copied).

Rhamdia breviceps Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 124, 1888, (name only).

Habitat: Marabitanos.

This species is known from a single specimen in the museum at Vienna.

If, as Kner states, this species really does not possess a fontanel nor an occipital process, it of course represents a genus distinct from *Rhamdia* as here understood.

80. Rhamdia schomburgkii.

Pimelodus maculatus Schomburgk, Fish. Brit. Guiana, i, 175, 1843.

Rhamdia schomburgkii Bleeker, Ich. Arch. Ind. 208, 1858 (Brazil; Guiana).

Habitat: Guiana; Brazil.

81. Rhamdia bathyurus.

Pimelodus bathyurus Cope, Proc. Am. Phil. Soc. xvii, 674, 1878, (Peruvian Amazons).

Rhamdia bathyurus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 124, 1888 (name only).

Habitat: Marañon.

82. Rhamdia obesa.

Rhamdia obesa Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 124, 1888 (Teffé).

Habitat: Teffé.

Body short and deep; its greatest width less than its greatest depth; head short, its width 1⅕ in its length; width at the angle of mouth 2 in its length, the head flat above, covered with very thin skin, the surface of the bones deeply furrowed, the striations radiating from the eyes and from the pit at the base of the occipital process. Fontanel a narrow fissure between the frontal bones. Occipital process very long, partly concealed by skin, reaching more than half way to the dorsal spine, to near the large, concealed dorsal plate. Pores scattered over the head.

Eye round, 2¼ in snout, 6¼ in head, 2 in the interorbital; its posterior margin in front of the middle of the head.

Maxillary barbel (torn on one side) extending to the tips of the middle caudal rays; mentals to the middle of the pectoral; postmentals to half way between tips of pectorals and base of ventrals.

Jaws equal, mouth comparatively small, teeth of the mandible as usual; teeth of the upper jaw in a band which is shallowed and interrupted in the middle, its depth about 9 in its width.

Gill-rakers 3+9.

Distance of dorsal spine from snout 2⅖ in the length. Dorsal fin shorter than high, the highest ray 1⅖ in head. Distance of adipose fin from the dorsal equal to ⅓ the length of the latter. Adipose fin twice as long as the dorsal, 3 in the length.

Caudal deeply cleft, the lobes longer than the head, about 3 in the length.

Anal short and high, its free margin narrowly rounded; the highest ray 2 in head.

Ventrals inserted below the vertical from the last dorsal ray, 1⅘ in head.

Pectoral spine strong, terete, with short hooks on the anterior margin near tip and short teeth nearly the entire length of the posterior margin; 1½ head.

A large dark humeral spot; fins all dusky; the usual pale bar on the dorsal fin near its base.

Head 3¾; depth below dorsal spine 5, above first anal ray 4½; depth of caudal peduncle 8; Br. 7; D. I, 6; A. 10.

Type: No. 7518. Teffé. Agassiz. Length .26 m.

83. Rhamdia sebæ.

Seba iii, plate 29, fig. 5.

Rhamdia ou bagre de Rio Marcgrave, 149.

Mystus No. 83, Gronow, Mus. Ichthyol. i, 34; *No. 384*, Zoophyl. 125.

Pimelodus sebæ Cuv. & Val. Hist. Nat. Poiss. xv, 169, 1840 (Surinam; Cayenne; Rio Janeiro; Buenos Ayres); Hyrtle, Denk. Ak. Wien, xvi, 1859, 16 (vertebræ 11+2+26); Quoy & Gaimard, Voy. de Freycinet, Zool. 228, plate xlix, figs 3 and 4; Günther, Cat. Fish. Brit. Mus. v, 119, 1864, (Demarara; British Guiana; Brazil).

Pimelodus (Rhamdia) sebæ Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstlichen Brasiliens, iii, 68 (Demarara; Essequibo; St. Martha, mouth of the Magdalena); Steindachner, Fisch-Fauna, Magd. Stromes, 17, 1878 (Magdalena); Steindachner, Fisch-Fauna des Cauca & Flüsse bie Guayaquil, 7, 1879 (Cauca).

Rhamdia sebæ Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 126, 1888, (Tonantins; Gurupa; Rio Janeiro; Bahia; Xingu; Santa Cruz; Cudajas; Sao Matheos; Rio Doce; Serpa; Tabatinga; Goyaz; Para; Teffé; Surinam; Villa Bella).

Pimelodus stegelichii Müller & Troschel, Horæ Ichthyol. iii, 3, 1849 (Surinam); Günther, Cat. Fish. Brit. Mus. v, 121, 1864 (Demarara; Surinam).

Pimelodus musculus Müller & Troschel, Horæ Ichthyol. iii, 4, 1849 (America).

Pimelodus holomelas Günther, Ann. & Mag. Nat. Hist. xii, 1863, 442 (Essequibo); Günther, Cat. Fish. Brit. Mus. v, 120, 1864 (Essequibo).

Pimelodus mülleri Günther, Cat. Fish. Brit. Mus. v, 119, 1864 (River Capin, Para; Surinam).

Habitat: Rio Janeiro to Rio Magdalena; Amazons to Tabatinga.

Width below the first dorsal ray equals the depth; body strongly compressed near the caudal; head flat above, the sides of the head sometimes making a decided angle with the top, sometimes sloping without any distinct angle; greatest width of the head about 1¼ in its length, its width at the angle of the mouth 2 in its length. Top of the head covered with a usually thin skin, the surface of the bones smooth in the young, becoming roughened with age. Fontanels in the young, three. In specimens .10 m. long they are reduced to a narrow slit in the center of the occipital bone: this remains in the adult as a circular depression; a small circular opening above the posterior margin of the eye, which usually disappears with age; and the usual frontal fontanel, persistent in all stages of growth, but reduced to a narrow slit with age. Occipital process extending half way to the dorsal spine. Large pores regularly distributed about the head, sometimes innumerable pores on cheeks.

Eye sometimes circular, sometimes elliptical. In specimens .10 m. the eye measures 2 in snout, 1½ in interocular, 5 in head; in specimens .25 m. 3 in snout, 3 in interocular, 7½ in head.

Maxillary barbels either compressed or filiform, extremely variable in length; when shortest extending to the middle of the adipose fin—when longest extending beyond the caudal. They are longest in specimens from .10 to .15 m. and are shorter in both young and adult.

The postmentals vary in length, their tips extending to middle of the pectorals or as far as the middle of the ventrals. Sometimes the barbels are much shorter on one side than on the other.

Mouth wide, terminal, the jaws usually equal, but the lower sometimes considerably shorter. Teeth of the lower jaw as usual, those of the upper in a very shallow interrupted band; its depth 7–10 in its width.

Gill rakers long and slender, simple, 2+8.

Distance of dorsal fin from snout 2¾ to 3 in the length; dorsal spine slender, pungent, with a few notches near the tip in front; 2–2½ in head; highest dorsal ray 1¼–1½. Distance of adipose fin from the dorsal fin variable, always less than the length of the dorsal; adipose fin 2⅕–3 in the length.

Caudal cleft to near its base, the lower lobe broader and rounded, 3½–4½ in the length.

Anal higher than long, the tips reaching to below the vertical from the end of the adipose or sometimes two diameters of the eye shorter.

Ventral inserted below the vertical from the last dorsal ray, 1½ in head.

Pectoral spine roughened with minute straight teeth behind, and recurved teeth near the tip on the anterior margin, 1½–1⅓ in head.

Color brown, a darker humeral spot; fins all dusky; dorsal with the usual light transparent band, sometimes with a black spot between the last two rays. The color sometimes uniform black; sometimes very light brown. Head 4–4½ ; depth 4½–7 ; depth above first ray 5⅓–6; depth of caudal peduncle 8–10.

Br. 7; D. I, 6; A. 9–12.

The specimens examined, more than sixty, are from Tonantins, Gurupa; Rio Janeiro; Bahia; Xingu; Santa Cruz ; Cudajas ; Sao Matheos ; Rio Doce; Serpa; Tabatinga; Goyaz; Para. The three Para specimens have a shorter and less angular head; head 4½ in the length. Teffé have the head more pointed; Surinam: maxillary barbel much shorter on one side than on the other; Rio de Janeiro head angular; Villa Bella .09 m. spec. nov.? head 3½ in the length; ventrals almost to anal; pectoral spine 1⅞ in head; maxillary barbels beyond base of caudal; adipose 2¾.

83a. Rhamdia sebæ kneri.

Pimelodus sebæ Kner, SB. Ak. Wien, xxvi, 417, 1857, (Marabitanos); not *P. sebæ* C. & V.
Pimelodus (*Rhamdia*) *kneri*, Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 73, foot note (Cujaba).
Rhambia sebæ kneri Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 126, 1888 (Tabatinga; Jutahy).
?*Pimelonotus vilsoni* Gill, Ann. Lyc. Nat. Hist. N. Y. vi, 391, 1858 (Trinidad).
?*Pimelodus wilsoni* Günther, Cat. Fish. Brit. Mus. v, 122, 1864 (copied); Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).
Rhamdia queleni Bleeker, Silures de Suriname, 75, 1864 (Surinam).
Habitat: Upper Paraguay and northward.

The specimens examined are from Tabatinga and Jutahy. This variety differs from *sebæ* only in the size of the eye. "Eye in young 3¾ in head," in specimens .27 m. long, 5½; "head in young 5 in the length," in adult 4¼; adipose fin "in young less than 2 in the length," in adult 2½–3. Jaws equal or the lower shorter.

P. vilsoni seems to differ from *kneri* only in having a projecting lower jaw.

84. Rhamdia foina.

Pimelodus foina Müller & Troschel, Schomburgk, British Guiana, 628, 1848 (Takutu); Müller & Troschel, Horæ Ichthyol. iii, 5, 1849 (Guiana); Günther, Cat. Fish. Brit. Mus. v, 130, 1864 (copied).
Rhamdia foina Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 126, 1888 (name).
Habitat: Guiana.

85. Rhamdia humilis.

Pimelodus humilis Günther, Cat. Fish. Brit. Mus. v, 129, 1864 (Venezuela); Cope, Proc. Am. Philos. Soc. xvii, 1878, 674 (Peruvian Amazon).

Rhamdia humilis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 126, 1888 (name only).

Habitat: Marañon to Venezuela.

86. Rhamdia cinerascens.

Pimelodus cinerascens Günther, Proc. Zool. Soc. Lond. 1860, 237, pl. 10, fig. A (Esmeraldas); Günther, Cat. Fish. Brit. Mus. v, 130, 1864 (Guayaquil; Esmeraldas); Steindachner, Fisch-Fauna des Cauca & Flüsse bei Guayaquil, 44, 1880 (Rivers near Guayaquil).

Rhamdia cinerascens Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 126, 1888 (name).

Habitat: Western slopes of Ecuador.

87. Rhamdia pentlandi.

Pimelodus pentlandi Cuv. & Val. Hist. Nat. Poiss. xv, 183, pl. 435, 1840 (tributaries of Lake Titicaca); Hyrtle, Denk. Ak. Wien, xvi, 1859, 16 (vertebræ 12 + 4 + 24); Günther, Cat. Fish. Brit. Mus. v, 129, 1864 (types); Steindacher, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 48 (Monterico; Tullumayo); Steindachner, Flussfische Südamerika's, iv, 25, 1882 (Rio de Huambo.)

Rhamdia pentlandi Eigenm. & Eigenm. Proc. Cal. Acad., 2d Ser. i, 126, 1888, (name).

Habitat: Peruvian Andes.

88. Rhamdia quelen.

Pimelodus quelen Quoy & Gaimard, Voy. Uran. Zool. pl. 49, figs. 3-4, 1824.

Rhamdia quelen Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 126, 1888 (Santa Clara; Rio Mucuri; Juiz de Fora; Campos; Rio Jequitinhonha; Mendez; Rio de Janeiro; Macacos; Sao Matheos; Rio Parahyba; Cannavierias; Rio Grande do Sul).

Pimelodus queleni Günther, Cat. Fish. Brit. Mus. v, 123, 1864 (Brazil).

Rhamdia queleni Bleeker, Nederl. Tijdschr, Dierkunde, i, 101, 1863 (name only).

Pimelodus (*Rhamdia*) *queleni* Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 64 (Rio Parahyba, near Juiz de Fora; Campos; Rio Doce; Porto Alegre; Cannavierias; Amazon, near Para; Bahia).

Heterobranchus sextentaculutus Agassiz, Gen. Spec. Pisc. Bras. 28, plate 11 (12 in. long, loc.?)

Pimelodus sellonis Müller & Troschel, Horæ Ichthyol. iii, 2, 1849 (Brazil).

?*Pimelodus bahianus* Castlenau, Anim. de l'Am. du Sud, 35, pl. xvi, fig. 2, 1855 (Bahia).

Pimelodus sebæ Kner, SB. Ak. Wien, xxvi, 417, fig. 19, 1857 (Marabitanos).

Silurus sapipoca (Natterer MS.) Kner, l. c., 418.

Pimelodus wuchereri Günther, Cat. Fish. Brit. Mus. v, 123, 1864 (Bahia).

Pimelodus (*Rhamdia*) *queleni cuprea* Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 65 (Juiz de Fora).

Pimelodus (*Rhamdia*) *cuyabæ* Steindachner, l. c., 76, foot-note (Cuyaba).

Habitat: Rio Plata, north to the Amazon.

This species seems to be most abundant southward; it is subject to many variations. It is very closely related to *Pimelodus sebæ* C. & V.; the only constant difference is the length of the barbels. *Heterobranchus sextentaculatus* Ag. agrees better with *quelen* than with any other known species. The plate of *Pimelodus bahianus* Castelnau probably represents one of the variations of *quelen.* We give a description of the species, and then add the variations with the localities.

Width of body less than its depth, strongly compressed towards the tail. Head flat above, the sides sometimes making an angle, sometimes not; greatest width of head 1¼–1⅙ in its length; width at the angles of the mouth 2 in head; head covered with (usually) thin skin, the surface of the bones either smooth or striate. Fontanel as in *sebæ.* Occipital process extending about half way to the dorsal spine; large pores distributed in definite regions about the head.

Eye 2¼–2¾ in snout, 6–7 in head, 2½–2¾ in interocular space.

Maxillary barbels extending to the posterior third of the adipose in young, much shorter in adult; mentals not to pectoral, postmentals beyond base of pectoral.

Mouth wide, terminal; teeth of the lower jaw as usual, those of the upper jaw in a band of uniform depth which is 6½–8 in its width. Gill-rakers sometimes simple, sometimes profusely branched, 2+10.

Distance of dorsal spine from tip of snout 2¾–3 in the length. Distance of adipose from dorsal variable, always much less than length of dorsal. Adipose fin 2½–3⅓ in the length.

Caudal deeply forked, the lobes rounded, 4½–5 in the length.

Anal either higher than long or longer than high, the tips about reaching as far as the end of the adipose fin.

Ventrals below the vertical from last dorsal ray, 1¾–1⅘ in head. Pectoral spine strong, its posterior margin with short teeth: with recurved hooks near tip of anterior margin, 1¾ in head.

Color from uniform black to light brown or coppery.

Head 4–4¼; depth 4–6½; depth above first anal ray 5–6; depth of caudal peduncle 8–9½; D. I, 6–8; A. 10–12; Br. 6–7.

The specimens examined are from Santa Clara; Rio Mucuri .11 m. long; light-brownish mottled with darker; adipose fin, 3–3¼ in the length; Juiz de Fora: light brownish, adipose fin margined with black; maxillary barbels not extending to the end of the dorsal; Campos: colored as the Juiz de Fora specimens; depth 4½–6 in the length; Rio Jequitinhonha; Mendez: adipose fin 2⅔ in the length beginning immediately behind the dorsal; Rio de Janeiro: depth 4½–6½; the largest specimen has the head depressed between the eyes; maxillary barbels not extending to the end of the dorsal; depth of the intermaxillary band of teeth 8 in its width; fontanel none, the region replaced by honeycomb structure; Sao Matheos: agrees with Dr. Günther's description in all respects; the gill-rakers are profusely branched; Rio Mucuri: entirely black, dorsal rays 7; maxillary barbels reach to the adipose fin; Macacos: 11 specimens, 4 of them with D. I, 7; Rio Parahyba: 3 specimens, D. I, 7 in one specimen; Cannavierias .31 m. has a very deep body and rather small eyes; Rio Parahyba: reddish brown with dark markings, caudal black; Rio Grande do Sul, Emperor's collection, one specimen, has D. I, 7.

89. Rhamdia multiradiatus.

Pimelodus multiradiatus Kner, SB. Ak. Wien, xxvi, 414, 1857, (Borba on the Rio Madeira; Forte do Rio Branco on the Rio Facutu).

Notoglanis multiradiatus Günther, Cat. Fish. Brit. Mus. v, 136, 1864 (copied).

Rhamdia multiradiatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 126, 1888 (name).

Pimelodus arekaima Schomburgk, Fish. Brit. Guiana, part i, 178 (not plate v), 1841 (Upper Essequibo).

Habitat: Amazon and its tributaries, and northward.

90. Rhamdia sapo.

Pimelodus sapo Valenciennes, in Voy. d'Orbigny, ix, Atlas ii, pl.ii, figs. 6–8, 1847; Cuv. & Val. Hist. Nat. Poiss. xv, 179, 1840 (Buenos Ayres); Kner, SB. Ak. Wien, xxvi, 417, 1857 (loc.?); Günther, Cat. Fish. Brit. Mus. v, 132, 1864 (Rio Plata); Steindachner, SB. Ak. Wien, lx, 1869, Ichthyol. Notiz. ix, 5 (Montevideo); Hensel, Wiegm. Arch. 1870, i, 69 (Guahyba).

Pimelodus (Rhamdia) sapo Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 60 (La Plata; Rio Grande do Sul).

Rhamdia sapo Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 126, 1888 (Rio Grande do Sul).

Habitat: Rio Plata; southern Brazil.

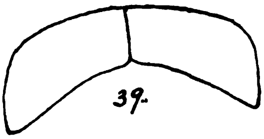
Five specimens from .18–.405 m. in length, from the Rio Grande do Sul, the Emperor's collection.

Body rather robust, its greatest width less than its greatest depth.

Head elongate, flat above, its greatest width 1⅓ in its length; width at the angle of the mouth 2 in head; the head entirely covered with skin; fontanel not continued behind the eye; occipital process small, imbedded. Large patches of radiating pores between and behind the eyes, on the upper and lower angles of the opercle; the patches with fewer pores in some individuals; in the adult the pores on top of the head become detached and circular; minute, inconspicuous pores scattered everywhere about the head.

Eye nearly median, slightly nearer tip of snout than to edge of opercle, 5½–8 in head, 2–3½ in snout, 1½–2½ in interorbital.

Maxillary barbels extending past middle of adipose fin in the young, scarcely to end of dorsal in adult; postmentals little beyond base of pectorals.



Jaws subequal, the upper sometimes a little longer; width of intermaxillary band of teeth 2⅘–3 in head, the band rather deep, its depth 4–4½ in its width; mandibulary band very deep in front, tapering to a fine point. Lips conspicuously papillose.

Distance of dorsal spine from snout 2½ in the length; the length of the spine 2–2⅓ in the head, the base of the fin much longer than the highest ray. Distance of adipose fin from the dorsal ½–⅓ the dorsal's base. Adipose fin 3–3½ in the length.

Caudal deeply forked, the lower lobe broader, 1⅓ in head. Tip of anal ray scarcely reaching the vertical from the end of the adipose fin. Ventrals 1⅗–2⅕ in head.

Pectoral spine stout, recurved teeth on its anterior margin, strongest near the tip of the spine, 2½–2¾ in head.

Color uniform brown.

Head 3½–3⅘; depth 4½–6½; depth of caudal peduncle 9–10½; D. I, 7–8; A. 11–12.

91. Rhamdia hilarii.

Pimelodus hilarii Cuvier & Valenciennes, xv, 180, 1840 (Rio San Francisco; Montevideo); Günther, Cat. Fish. Brit. Mus. v, 132, 1864 (copied).

Rhamdia hilarii Lütken, Dan. Selsk. Skr. 175, with figure, 1875, (Rio das Velhas); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 126, 1888 (Bon Jardin).

Habitat: Rio San Francisco and its tributaries; Porto Alegre south to Rio Plata.

Width below the dorsal spine about equal to its depth, tapering to the caudal peduncle. Head rather short and broad, its width 1⅓ in its length. Skin of the head very thin, the surface of the bones little if at all roughened; snout flat and broad, its width at the angle of the mouth 2 in the head. Fontanels in the young three: 1, a small round one at the base of the occipital process—present in the largest specimen; 2, a small one behind the orbital bridge—obliterated in the adult, and 3, the usual one between the frontal bones. Occipital process continued to half way to dorsal spine. Numerous groups of pores about the head; a group behind the posterior nasal opening, a larger group between the middle of the eyes; a group above the posterior margin of each eye and a group behind each of these; a group behind the eye; one at the upper angle of the opercle another near its lower angle, other groups below the eye and elsewhere.

Eye in smallest specimen 1½ in snout, 5 in head, 1½ in interorbital; in largest specimen 2¼ in snout, 6½ in head, 2 in interorbital.

Maxillary barbel extending scarcely beyond the end of the dorsal fin in the largest specimen, to its middle in some of the smaller specimens; mental barbels reaching to the base of the pectoral, postmentals to the middle of the pectoral.

Mouth wide terminal; in the largest specimen the jaws are equal, in the smaller the upper jaw projects. Teeth of the lower jaw as usual; those of the upper jaw in a band of uniform depth, 7 times wider than deep, interrupted in the middle.

Gill membranes separated to below the angle of the mouth; gill-rakers 2+7.

Distance of the dorsal fin from tip of snout 3 in the length; the fin not longer than high; highest ray 1⅓–1½ in the head; the rays nearly of the same height. Distance of the adipose fin from the dorsal ½–⅓ the length of the latter. Adipose fin 2⅔–3 in the length.

Caudal deeply cleft, the lower lobe wider and slightly longer, little shorter than the head.

Anal shorter than high; its free margin rounded; its longest ray about half as long as the head.

Ventral fins inserted under the vertical from the seventh or eighth dorsal ray, 1⅗ in the head.

Pectoral spine slender, with strong recurved hooks on its anterior margin near the tip, and much weaker teeth along its posterior margin; its length 2 in head, longest ray 1½.

Color brownish with indistinct darker spots and mottlings; caudal and anal dusky, the membrane of the dorsal thickened at the base, a transparent bar above it, the upper half of the membrane dotted with dark points.

Head 4; depth 6–7. Caudal peduncle 10. Br. 7; D. 7–9; A. 12.

One specimen .21 m. and another .095 m. have 9 dorsal rays, one .107 m. has 7 dorsal rays, the rest .12 m. .085 m. and .07 m. have 8 dorsal rays each. Bon. Jardin on the Rio San Francisco; Porto Alegre, D. I, 7.

Four specimens, locality unknown, have 7 dorsal rays each, one has 8.

92. Rhamdia wagneri.

Pimelodus cinerascens Kner & Steindachner, Abh. Bay. Ak. x, 49 (not of Gunther).

Pimelodus wagneri Günther, Fishes Cent. Am. 393 and 474, 1866 (Pacific and Atlantic rivers of Panama); Steindachner, Flussfische Sudamerikas, i, 14, 1879 (Mamoni river near Chepo).

Rhamdia wagneri Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 126, 1888 (Gorgona; Rio Chagres; Rio Obispo; Turbo; Atlantic coast Central America).

Rhamdia bransfordii Gill, Proc. Acad. Nat. Sci. Philad. 1876, 337 (Panama).

Habitat: Eastern and western slopes of Central America.

The *Rhamdia bransfordii* Gill differs from specimens of *wagneri* only in color and their identity can scarcely be doubted especially as the color is frequently obliterated in alcohol.

Width of body behind the pectorals about equal to its depth, much compressed toward the tail. Head flat above, its sides almost vertical, its greatest width 1½–1⅖ in its length. Profile from tip of occipital process to snout nearly straight. Width of the snout at the rictus about 2 in the head. Occipital process narrow, extending about half way to the dorsal spine.

Eye 2½ in snout, 7 in head, 2¼ in interorbital. Maxillary barbel sometimes extending to near the posterior end of the adipose fin, sometimes scarcely beyond the base of the dorsal; mental barbel to base of pectoral; postmentals beyond middle of pectoral.

Lower jaw shorter than the upper; mandibulary band of teeth scarcely interrupted in the middle, tapering to a point behind the rictus; depth of intermaxillary band of teeth 7 in its width. Gill-membranes separate, overlapping; gill-rakers 3+7. Distance of dorsal fin from snout about one-third of the length. Free margin of the dorsal rounded, the base of the fin about equal to its height, 1½–1¾ in head. Distance of the adipose fin from the dorsal more than half the length of the dorsal.

Caudal divided to near its base, the lower lobe broad and rounded, the upper pointed, about equal to the head in length, usually shorter.

Tips of the anal rays when laid backward, not reaching the vertical from the tip of the adipose fin; free margin of the anal rounded; the longest ray 2–2¼ in length of head.

Ventrals inserted below last dorsal ray, 1⅗–1⅔ in head.

Pectoral spine short, stout, with recurved hooks or notches near its tip in front, the posterior margin with short straight teeth; the longest ray 1½ in head.

Color brownish, with numerous minute dark dots; a dark lateral band, deepest at the shoulder.

Head 4¼–4⅓; depth 5½–7; Br. 7; D. I, 6; A. 9–11.

The specimens examined are from Gorgona; Rio Chagres; Rio Obispo; Turbo, Atlantic Coast Centr. Am.

93. Rhamdia longicauda.

Pimelodus longicauda Boulenger, Proc. Zool. Soc. Lond. March 1887, 275, plate xx, fig. 2 (Canelos).

Rhamdia longicauda Eigenm. & Eigenm. Proc Cal. Acad. 2d Ser. i, 126, 1888 (name).

Habitat: Eastern Ecuador.

This species is known only from the description and figure quoted above.

94. Rhamdia dorsalis.

Rhamdia dorsalis Gill, Proc. Acad. Nat. Sci. Philad. 1870, 94 (Upper Amazon).

Habitat: Marañon.

This species is known only from the types.

95. Rhamdia poeyi.

Rhamdia poeyi Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 127, 1888 (Goyaz).

Habitat: Goyaz.

Width of body about equal to its depth, much compressed toward the caudal. Head short, flat above, the sides not very steep, its greatest width 1¼ in its length; fontanel not continued behind the eye; occipital process very short, triangular, reaching two-sevenths the distance from its base to the dorsal spine. A few large pores about the head.

Eye 3 in snout, 7 in head, 1½ in interorbital.

Maxillary barbels scarcely reaching the vertical from the dorsal spine; postmental barbels about reaching to the edge of the branchiostegal membrane, the mentals less than half as long.

Branchiostegal membrane separate to below the anterior part of the eye. Gill-rakers 3+7.

Distance of dorsal spine from tip of snout less than 3 in the length. Distance of adipose fin from the dorsal equals the length of the dorsal. Adipose fin very low in front, its length about 3¼ in the length.

Pectorals and ventrals very short. Pectoral spine short, terete, about half as long as the head, its outer margin smooth, the inner margin with strong teeth the entire length.

Color brown, the sides and back densely covered with small brown dots and more minute black ones; a dark humeral spot; a narrow, dark lateral band.

Head 4½; depth above first anal ray 7; depth of the peduncle 9½; Br. 6; D. I, 6; A. 13.

One specimen .175 m. (to base of caudal). Goyaz. Senhor Honorio.

96. Rhamdia tenella.

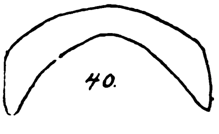
Rhamdia tenella Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 127, 1888 (Cudajas).

Width behind the head equal to the depth, tapering to the strongly compressed caudal peduncle. Head broad and flat transversely, its greatest width 1⅓ in its length; profile regularly and strongly convex; width at angle of mouth 2 in length of head. Fontanel a narrow slit between the frontal bones. Occipital process extending a third of the space from its base to the dorsal spine.

Eye 3 in snout, 9 in head, 2½ in the interorbital.

Maxillary barbels reaching beyond the dorsal fin, mental barbels to base of pectoral, postmentals to middle of pectorals.

Lower jaw shorter than the upper; intermaxillary band of teeth twice as deep at outer margins as at the middle; the greatest depth of the band 3½ in its width.



40.

Gill-membranes separate to below angle of mouth; gill-rakers slightly branched, 3+10.

Distance of dorsal fin from snout 3 in the length; dorsal rays of nearly uniform height, higher than the spine. Distance of the adipose from the dorsal fin 2 in the length of the dorsal fin, its distance from the caudal less than a diameter of the eye.

Caudal deeply forked, the lower lobe broader, rounded, 1⅓ in head.

Anal longer than high, its longest ray 2¼ in head; tip of the anal fin not reaching the vertical from the end of the adipose by the length of the snout.

Ventrals inserted behind the vertical from last dorsal ray, 2 in head.

Pectoral spine very strong, scarcely shorter than the longest ray, recurved hooks on upper three-fourths of its outer margin; a deep groove almost the upper half of its inner margin, the basal third roughened; its length 1¾ in head.

Color brownish; fins dusky; adipose margined with black.

Head 4¼; depth 6¾; depth, above first anal ray, 8; depth of caudal peduncle 10; Br. 7–8; D. I, 6; A. 11.

Type No. 7547. Length .31 m. Cudajas.

XVI. RHAMDELLA.

Rhamdella Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 129, 1888 *(eriarcha)*.

Type: *Rhamdella eriarcha* E. & E.

Fontanel continued to the occipital process, a bridge behind the eyes. Dorsal and pectoral fins with strong spines. Ventrals placed below or behind the dorsal. A free orbital margin.

Habitat: Rio Janerio to Mexico.

ANALYSIS OF THE SPECIES OF RHAMDELLA.

a. A. 15–18.

b. Adipose fin little longer than anal.

c. Color plain; occipital process minute; eye small, turned upward, much nearer snout than to posterior margin of opercle, 6–7 in head, 2 in the interocular; posterior nares much nearer the eye than to the anterior nares. Width of mouth 2 in head; jaws equal; maxillary barbels do not reach beyond tips of pectorals, postmentals not beyond their base; base of dorsal 2 in its distance from the adipose which begins behind the vertical from the insertion of the anal and reaches to the caudal. Pectoral spine smooth, about 3 in head; dorsal spine shorter but not stronger than the rays; caudal fin slightly emarginate. Grayish with darker markings. Head 5 in the length. D. I, 5–6; A. 16–18. (Lütken.) *microcephala* 97.

cc. Back and dorsal fin with numerous small black spots. Dorsal spine produced in a filament; dorsal and anal fins concave. Maxillary barbels extending to ventrals. Adipose fin scarcely longer than the dorsal fin. Br. 9; D. I, 6; A. 17. Vertebræ 44. Grows to large size. (Schomburgk.) *notata* 98.

bb. Adipose fin twice as long as anal. Eye large, nearer edge of opercle than to tip of snout. Maxillary barbels extending scarcely beyond head. Depth of intermaxillary band of teeth about 4 in its width. A. 15. *eriarcha* 99.

aa. A. 9–14.

d. Jaws equal; numerous pores about the head. Maxillary barbels extending to a point between the ventrals and anal. Eye elliptical, 5 in head, 2 in interocular, nearer snout than to opercular margin, Humeral process one-third as long as pectoral spine. Adipose fin 1⅓ times as long as the dorsal; caudal lobes equal. Dark brownish, with traces of a longitudinal band; no spot on adipose. Head 5; depth 5; D. I, 7; A. 13–14. (Jenyns.) *exsudans* 100.

dd. Upper jaw longer than lower.

e. A dark lateral band; occipital process moderate.

f. Dorsal spine very weak, low, 2¼–2¾ in head; pectoral spine 2–2⅕ in head; caudal fin 4⅙–5⅓ in the length (Mexican). *parryi* *

ff. Dorsal spine strong, high, 1¼–1¾ in head; pectoral spine 1¼–1⅓ in head; caudal fin about 3⅚ in the length. *jenynsii* 101.

ee. Several dark cross-bars, or plain; occipital process minute; head short, 5 in the length. *minuta* 102.

97. Rhamdella microcephala.

Rhamdia microcephala (Rheinhardt MS.) Lütken, Dan. Selsk. Skr. 177, pl. iii, fig. 7, 1875 (Rio das Velhas).

Habitat: Rio das Velhas.

This species is known only from the types; it is most nearly related to *R. notatus* (Schomb.) and *R. laticauda* Kner.

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*[*Rhamdia parryi*](#) Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. 1, 130, 1888 (Rio Zanaleneo; Chiapas; Mexico). We have dedicated this species to Dr. C. C. Parry of Davenport, Iowa.

98. Rhamdella notata.

Pimelodus notatus Schomburgk, Fish. Brit. Guiana, i, 181, pl. 7 (Fort St. Joaquim on the Rio Branco); Günther, Cat. Fish. Brit. Mus. v, 131, 1864 (copied).

Rhamdia notata Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 129, 1888 (name).

Habitat: Rio Branco.

The type of this species was over a metre long.

99. Rhamdella eriarcha.

Rhamdia eriarcha Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 129, 1888 (Rio Grande do Sul).

Habitat: Rio Grande do Sul.

A single specimen .26 m. from the Emperor's collection made at Rio Grande do Sul.

Body elongate slender, the width below the dorsal spine less than the depth. Head long, pointed, the fontanel continued to base of the occipital process which reaches about half way to the dorsal spine. Entire surface of the head covered with skin. Head flattish above, snout long and pointed, the width at the angle of the mouth 2⅘ in length of head.

Eye large, its center one-third or one-fourth nearer the posterior margin of the opercle than to the tip of the snout, 2 in snout, 4½ in head; the interorbital less than the diameter of the eye.

Maxillary barbels extending to the edge of the opercle; postmental barbels not reaching edge of branchiostegal membrane if drawn straight back.

Upper jaw projecting. Lips thick and strongly plicate. Intermaxillary band of teeth deep and narrow, the teeth minute. No teeth on vomer or palate.

Teeth of the lower jaw in a narrower band which tapers backward, the teeth similar to those of the upper jaw. Gill membranes separate to below middle of eye. Gill-rakers 1+5.

Distance of dorsal fin from end of snout 2⅘ in the length; the first ray of the dorsal scarcely spine-like, smooth; its height, including filament, 1⅗ in head; highest ray longer than the base of the fin, 1⅖ in the head. Distance of adipose fin from the dorsal equals the length of the dorsal; adipose fin 2⅘ in the length.

Caudal forked to the base, the upper lobe greatly produced, much longer than the head (broken off in the specimen).

Anal long and low, the posterior rays highest, 2½ in head, the tips when depressed not reaching the vertical from the end of the adipose by more than one diameter of the eye.

Ventrals broad, reaching to the anal, 1⅗ in head.

Pectoral spine strong, 1⅘ in head, roughened along both edges, the rays 1¼ in head.

A black lateral band; region above it chocolate, below, much lighter. Fins plain.

Head 4¾; depth 7; caudal peduncle 14; D. I, 6; A. 15.

100. Rhamdella exsudans.

Pimelodus exsudans Jenyns, Voy. Beagle, Fishes, 111, 1842 (Rio Janeiro?); Günther, Cat. Fish. Brit. Mus. v, 132, 1864 (copied).

Rhamdia exsudans Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 130, 1888 (name).

Habitat: ? Rio Janeiro.

This species is known from the description of the types which measure .089 and .057 m.

101. Rhamdella jenynsii.

Pimelodus gracilis Jenyns. Voy. Beagle, Fishes, 110, 1842 (Rio de Janeiro).

Pimelodus jenynsii Günther, Cat. Fish. Brit. Mus. vol. v, 128, 1864 (copied).

Rhamdia jenynsii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 130, 1888 (Maldonado).

Habitat: Rio de Janeiro south to the Rio Plata.

This species has so far been known only from the types. The Museum of Comparative Zoology contains 9 specimens from Maldonado which, while they do not agree with the description of the types in all respects are too near to be considered distinct.

Body short, compressed; head broad, its width $1\frac{1}{5}$ in its length, its depth $1\frac{1}{3}$; width of mouth at the rictus $2\frac{1}{3}$; profile straight to above the eyes, decurved in front of the eyes; interorbital region flat, postorbital convex in transverse profile; occipital process not reaching to the dorsal plate, covered with thick skin.

Snout depressed, flattish; upper jaw projecting; teeth of the upper jaw in a rather deep subcrescentic patch, interrupted in the middle, the width of the band little more than three in the head.

Maxillary barbels reaching about to the adipose fin; mental barbels little beyond eye; postmentals to base of pectoral.

Eye small, 5 in head, 2 in the snout, $1\frac{1}{3}$ in the interorbital.

Gill membranes separate to below the anterior portion of the eye; humeral process extending about to middle of pectoral spine.

Dorsal spine equidistant between the snout and the anal; entirely smooth in front, its length $1\frac{2}{5}$ in the head, the longest dorsal ray $1\frac{1}{5}$.

Distance of adipose fin from the dorsal fin equals the length of the dorsal fin; adipose fin about 4 in the length.

Caudal deeply lobed, the upper lobe longer, 4 in the length.

Anal fin sometimes extending beyond tip of adipose fin, the longest ray $1\frac{4}{5}$ in head. Ventrals $1\frac{1}{2}$ in head.

Pectoral spine $1\frac{1}{5}$ in head, its anterior margin almost smooth, its posterior margin with about ten teeth, largest along the middle third or half of the spine.

Depth of caudal peduncle $2\frac{2}{5}$ in head.

Color dark brown, everywhere with minute darker dots; a dusky lateral band which is continued forward on head in some specimens.

Head 4–4½; depth about 5; Br. 7; D. I, 6; A. 10–12.

102. Rhamdella minuta.

Rhamdia minuta Lütken, Dan. Selsk. Skr. 179, pl. iii, fig. 6, 1875 (Rio das Velhas); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 131, 1888 (Rio Janeiro; Macacos).

Habitat: Rio Janeiro to Macacos.

One specimen .083 m. Rio Janeiro. Dr. Emil Göldi.

Two specimens .10 m., and .11 m. Macacos. W. M. Roberts.

Body subterete, tapering, and somewhat flattened toward the caudal. Head very short, smooth and covered with skin above; profile convex, transverse section rounded. Occipital process reduced to a minimum, about one-third as long as the pupil; fontanel long, extending from in front of the eye to the occipital process, a bridge above the posterior part of the orbit. Some long, simple pores about the head.

Eye 1¾ in snout, 4½ in head, 1 in the interorbital.

Maxillary barbels reaching about to the end of the dorsal fin; mental barbels to the base of the pectoral, postmentals a little beyond.

Snout rather broad and depressed, the width at the rictus 2 in the head; greatest width of the head 1⅕ in its length.

Intermaxillary band of teeth narrowed in the middle, the greatest depth of the band about 5 in the width, the teeth all alike, villiform.

Branchiostegal membranes separate to in front of eye. Gill-rakers about 3+10.

Distance of dorsal from the tip of snout 2⅝ in the length, the dorsal spine produced in a filament, its height with the filament about equal to the length of the head; the rays rapidly decreasing in height to the last, the free margin truncate. Distance of adipose fin from the dorsal equals the length of the adipose fin, 5 in the length.

Caudal forked, the upper lobe little longer than the lower, less than 4 in the length.

Anal well developed, placed under the middle of the adipose fin, the tips of the last rays reaching the vertical from tip of adipose fin.

Ventrals inserted under the third dorsal ray, 1⅓–1⅕ in the head.

Pectoral spine short, with a flexible portion, which is 1½ times as long as the spinous portion; the spinous portion 2⅓ in the head; length of the pectoral fin about equal to the head.

Ground color light, the sides thickly covered with jet-black dots, about six short cross-bars on the back; top and sides of head profusely covered with minute black dots; caudal and adipose dotted with black, other fins plain.

Head 5; depth 7½; Br. 7; D. I, 6; A. 10.

Air-bladder narrow, reniform, its longitudinal axis transverse, lying under the lateral processes of the first vertebræ.

XVII. HEPTAPTERUS.

Heptapterus Bleeker, Ichthyol. Arch. Ind. Silur., 197, 1858 *(mustelinus)*.

Type: *Pimelodus mustelinus* C. & V.

Caudal obliquely rounded. Dorsal fin without a spine, placed above the ventrals. Eye small, without a free orbital margin; adipose fin long and low, confluent with the caudal. Air-bladder reniform. Anal rather long. Fontanel very narrow, continued to the base of the occipital, with a narrow interruption behind the eyes.

This genus has been placed by Dr. Günther with his *Siluridæ Opisthopteræ;* it has been entirely overlooked by Gill in his arrangement of the families of fishes. The fact that it possesses a free air-bladder seems to us to be of much more significance than the mechanical position of the dorsal or ventrals, especially as *Rhamdella minuta* and *microcephala* have the dorsal placed over the ventrals.

103. Heptapterus mustelinus.

Pimelodus mustelinus Valenciennes, Orbigny, Voy. Amér. Merid. Poiss. pl. 2, fig. 1-4, 1847; Cuv. & Val. Hist. Nat. Poiss. xv, 165, 1840 (La Plata); Hensel, Wiegm. Arch. 1870, i, 77 (St. Cruz, Rio Grande do Sul).

Heptapterus mustelinus Günther, Cat. Fish. Brit. Mus. v, 271, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 172, 1888 (Maldonado).

Habitat: Rio Grande do Sul; Rio Plata.

Caudal portion compressed, the abdominal portion very little depressed. Head depressed, its depth 1½ in its width, entirely covered with smooth skin.

Eye an orbital diameter nearer tip of snout than to the gill opening.

Maxillary barbels reaching to middle of pectoral fins, the mental and postmental barbels to the edge of gill-opening. Width of mouth 2 in length of head, the gape about 2 in the snout. Teeth villiform in both jaws.

Gill-membranes separate to below the eye.

Distance of dorsal fin from tip of snout 2⅘ in the length, the first ray not stiffened. Adipose fin very long and rather low, originating a little nearer the dorsal fin than the length of the latter, continuous with the caudal fin.

Caudal fin rounded, its accessory rays continued forward below to the anal fin, but wholly free from it, anterior portion scarcely rayed, adipose-like.

Anal long and low, inserted a little posterior to the adipose fin.

Ventrals inserted a very little posterior to the origin of the dorsal fin, reaching about half way to the anal, the pectoral fins not quite so near to the ventrals.

Color uniform grayish, everywhere dotted with dark except on the belly; fins also punctate, the anal and ventrals least so.

Head 5; depth 8; D. 7; A. 24.

Two specimens .045–.05 m. Maldonado. Th. Carey.

XVIII. ACENTRONICHTHYS.

Acentronichthys E. & E. Proc. Cal. Acad. Sci. 2d Ser. i, 28, 1889 (*A. leptos*).

Type: *Acentronichthys leptos* E. & E.

Caudal widely forked; occipital process small, not continued to the dorsal; fontanel extending to the base of the occipital. Orbit without a free margin. Dorsal and pectorals without spines; ventrals under anterior half of dorsal; anal long. Allied to *Heptapterus*.

ANALYSIS OF THE SPECIES OF ACENTRONICHTHYS.

_a_. Adipose fin confluent with the caudal fin; first ventral ray below third dorsal ray; origin of anal slightly behind origin of adipose. D. 7; A. 19. Head 7¼. _leptos_ 104.

_aa_. Adipose fin not confluent with the caudal fin, its distance from the caudal equal to the length of its base; first ventral ray in front of the vertical from origin of dorsal.

- **_b_. D. 7; A. 18. Depth more than 2 in the head, which is 6 in the length. _surinamensis_ 105.**
- **_bb_. D. 8; A. 20. Head 5–6; depth 8–9; caudal forked, the upper lobe much the longer; anal fin long and low, its origin midway between end of dorsal and origin of adipose. (Steindachner.) _collettii_ 106.**

104. Acentronichthys leptos.

E. & E. Proc. Cal. Acad. Sci. 2d Ser. i, 29, 1889 (Sao Matheos).

Type: No. 7532; one specimen .105 m. Sao Matheos. Hartt & Copeland.

Extremely elongate, the depth of the caudal peduncle not much less than the greatest depth. Head long and narrow, not greatly narrowed forward, its width 1⅔ in its length. Cheeks steep.

Eye minute, one orbital diameter nearer tip of snout than to end of opercle; interocular about 2 in the snout. Maxillary barbels reaching beyond middle of pectoral, mental and postmental beyond base of pectoral. Mouth wide, terminal, the jaws equal, its width 2 in the length of the head; each jaw with a band of strong villiform teeth.

Origin of dorsal fin from tip of snout 3¼ in the length.

Adipose fin long and low, its origin in advance of the anal, confluent with the caudal fin. Caudal with numerous accessory rays, widely forked, its upper lobe longer, about 5½ in the length. Origin of anal a little nearer base of caudal than to gill opening, the rays of about equal height. Ventrals high and narrow, inserted below the first dorsal ray. Pectorals long and narrow, scarcely shorter than the head, the middle rays longest.

Brownish, with traces of a dark lateral band; a dark bar extending forward from the eye; two dark lines on base of caudal and parallel with its root.

Head 7½; depth 10; D. 7; A. 19.

105. Acentronichthys surinamensis.

Heptapterus surinamensis Bleeker, Silures de Suriname, 91, pl. xv, fig. 1, 1864 (Surinam); Günther, Cat. Fish. Brit. Mus. v, 271, 1864 (copied).

Habitat: Surinam.

This species is known from the types only.

106. Acentronichthys collettii.

Heptapterus collettii Steindachner, Flussfische Südam. iii, 7, pl. v. fig. 1, 1881 (Maldonado).

Habitat: Mouth of the Rio Plata in brackish water.

This species is known from the types only.

XIX. NANNOGLANIS.

Nannoglanis Boulenger, Proc. Zool. Soc. Lond. 278, 1887 *(fasciatus)*.

A. 8. Adipose fin present; dorsal fin without a pungent spine and placed behind the ventrals. Barbels six; Fontanel ? Occipital process ?

We have not seen the only known species of this genus but its general structure is so much like that of *Heptapterus* and *Rhamdella* that we think we are warranted in believing it to agree with those genera in the air-bladder, fontanel and occipital process.

107. Nannoglanis fasciatus.

Nannoglanis fasciatus Boulenger, l. c. 278, pl. xxi, fig. 3 (Ecuador)
Habitat: Ecuador.

Eye 3 in snout, 1⅓ in interocular. Maxillary barbels extending to the middle of the pectoral. Origin of dorsal fin midway between tip of snout and end of adipose which is as long as the head. Pectorals not reaching ventrals. Vent below origin of dorsal. Yellowish, with four broad, brown, black edged cross bands above; a dark brown line from eye to maxillary barbel. Head 5; depth 9; D. 7; A. 8. (Boulenger.)

XX. PIMELODELLA.

Pseudorhamdia Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserf. südöstl. Bras. iii, 46 (*lateristriga*), not *Pseudorhamdia* Bleeker.

Pimelodella Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 131, 1888 (*cristatus*).

Type: *Pimelodus cristatus* Müller & Troschel.

The name *Pseudorhamdia* is not available for this genus as the original type of it was *maculatus*. It is a synonym of *Pimelodus*. The characters of this genus are given in the key.

ANALYSIS OF THE SPECIES OF PIMELODELLA.

a. Adipose fin 2¼–2⅓ in the length.

b. No dark lateral band. Lower caudal lobe much broader than the upper, the lobes sometimes longer than the head, sometimes much shorter. Dorsal spine with fine teeth behind and several large notches near the tip in front. Pectoral spine rather stout, with fine, recurved teeth on its posterior margin ½–⅙ of the width of the spine, anterior margin roughened, with recurved hooks near the tip. Maxillary barbels not extending beyond tip of adipose except in young. *cristatus* 108.

bb. A dark lateral band; upper caudal lobe sometimes produced in a filament.

c. Dorsal spine with rather strong recurved hooks on both edges near the tip; height of the spine about equal to the pectoral spine, sometimes a little higher, sometimes a little lower. Maxillary barbels reaching to tip of adipose in specimens .22 m. long. *wesselii* 109.

cc. Dorsal spine smooth on its outer edge, its inner edge scarcely if at all roughened. Dorsal spine uniformly one-half a diameter of eye or more shorter than pectoral spine. Maxillary barbels reaching to beginning of anal in a specimen .11 m. long, scarcely shorter in larger specimens. *gracilis* 110.

aa. Adipose fin 3 or more in the length.

d. Dorsal I, 6; pectoral fins not extending to the ventral fins; ventrals not to the anal.

e. Pectoral spine strong, compressed, with 23 or 24 strong, recurved hooks on its posterior margin, the hooks not as long as the spine is wide; anterior margin with straight, minute teeth on its central half, recurved notches near its tip. Dorsal spine strongly curved, the posterior margin roughened near the tip, numerous recurved hooks on the upper half of the anterior margin. Eye 4 in head; interorbital three-fourths as wide as the orbital diameter. Maxillary barbel to beginning of the adipose fin. *pectinifer* 111.

ee. Pectoral spine with from 8–15 recurved hooks or teeth; dorsal spine straight.

f. Color plain, no dark lateral band; free margin of the dorsal rounded. Body rather elongate, slightly compressed posteriorly, head moderately broad and long, depressed, truncate anteriorly; snout somewhat produced, broad, 2⅗ in head; distance between angles of mouth nearly equal to the length of the snout. Maxillary barbels reaching to the origin of the anal; postmentals to middle of pectorals. Eye 4 in head, 1 in interorbital, equidistant from snout and gill-opening. Humeral process distinctly striate. Dorsal somewhat higher than long, the length of its base nearly equal to its distance from the head, the spine slender, stiff, rough superiorly and ending in a ray-like filament. Adipose fin about 3 in the length. Caudal deeply lobed, the lobes pointed, the upper longer, about equal to the head in length. Ventral inserted immediately behind the vertical from the dorsal. Pectoral spine not much shorter than the rays, the posterior margin serrate. Head 4⅘; depth 5½; Br. 6; D. I, 6; A. 12. (Günther.) *modestus* 112.

ff. A dark band on sides, not continued forward on head. The band is sometimes obsolete in alcoholic specimens.

g. Snout produced, nearly half the head in length; distance between the angles of the mouth nearly equal to the snout in length. Maxillary barbel reaching to the tip of the pectoral; postmentals to the root of the pectoral. Eye 4 in head, nearer gill-opening than to snout. Interorbital slightly wider than the diameter of the eye. Humeral process indistinctly striate. Dorsal higher than long, the length of its base equals its distance from the head. Adipose 3⅖ in body. Caudal deeply forked, the lobes pointed, upper lobe longer than head. Pectoral extending to below middle of dorsal, its spine stout, compressed, its posterior margin spiny. Uniform grayish above, white below; dorsal and caudal fins minutely dotted with black. Head 4¾; depth 5½; Br. 6; D. I, 6; A. 11. (Günther.) *elongatus* 113.

gg. Snout not produced.

h. Pectoral spine strong, compressed, with from 10–15 recurved hooks behind, the length of the hooks equals, or almost equals, the width of the spine.

i. Head conical or subconical. *lateristriga* 114.

ii. Head depressed, the sides slanting outwards, snout and postorbital portion of head slightly convex in cross-section; the occipital process scarcely reaching the basal bone of the dorsal spine. Eye nearer opercular margin than to snout. (Steindachner.) *harttii* 115.

hh. Pectoral spine curved, flattened, comparatively slender; its posterior margin "smooth" or with teeth which are not more than ⅙ or ⅛ the width of the spine, recurved notches near its tip in front. Maxillary barbel extending to the second fourth of the adipose dorsal. *buckleyi* 116.

fff. A dark band along the sides, continued forward on head; teeth of pectoral spine one-half the width of the spine.

j. Eye 4 in head; lateral band continued on head but not on caudal; pectoral spine slender, much as in *buckleyi*, but the teeth stronger. *vittata* 117.

jj. Eye 3¼–3⅓ in head, lateral band continued on head, and on the middle rays of the caudal; pectoral spine very broad, depressed, almost straight. *chagresi* 118.

dd. Dorsal rays I, 7; pectoral fin extending to the ventral fins, which reach to the anal; head flat; eye median; distance between the angles of the mouth 2⅓ in head. Maxillary barbels extending beyond origin of adipose dorsal; postmental barbels not to middle of pectoral. First dorsal ray slightly longer than head; dorsal spine shorter than the head; distance between dorsal and adipose fin longer than the base of the former; adipose dorsal 3⅔ in the length. Upper lobe of caudal 1⅓ times as long as head. Posterior serration of pectoral much weaker than in *gracilis*. Reddish-brown; a dark brown humeral spot; a narrow dark bar along the lateral line. Head 4⅓; depth 5. D. I, 7; A. 12. (Steindacher.) *brasiliensis* 119.

108. Pimelodella cristatus.

?*Pimelodus insignis* Schomburgk, Fish. Brit. Guiana, 180 (*not* plate).

Pimelodus cristatus Müller & Troschel, Schomburgk, British Guiana, 628, 1848 (Takutu and Mahu Rivers); Müller & Troschel, Horæ Ichthyol. iii, 4, 1849 (Guiana in Essequibo); Günther, Cat. Fish. Brit. Mus. v. 117, 1864 (Guiana; Essequibo; River Capin, Para); Vaillant, Bull. Soc. Philom. Series 7, iv, 152, 1880 (Calderon); Steindacher, Flussfische Südamerikas, iv, 4, 1882 (Rio Huallaga).

Pimelodella cristatus Eigenm & Eigenm, Proc. Cal. Acad., 2d. Ser. i, 132, 1888 (San Gonçallo; Avary; Villa Bella; Jutahy; Tapajos; Rio Mucuri; Tabatinga; Hyavary; Coary).

Pimelodus agassizii Steindachner, SB. Ak. Wien, lxxiv, July, 1876, Ichthyol. Beitr. v, 99 (Peruvian Amazon; Hyavary)

Pimelodus ophthalmicus Cope, Proc. Am. Philos. Soc. xvii, 675, 1878 (Upper Amazon).

Habitat: Rivers emptying into the Atlantic north of Cape San Roque; whole course of the Amazon.

The *Pimelodus cristatus* M. & Tr. and *Pimelodus insignis* Sch. are evidently identical.

The description of *insignis* does not agree with the plate which represents *Callophysus lateralis* Gill=*macropterus* Lichtenstein.

Schomburgk, l. c., says that "The Wapisiana Indians call this fish 'Konnairu,' it grows to about the length of eighteen inches."

Müller & Troschel quoting Schomburgk's notes say the "Wapisianas call it 'Komairu;' it reaches a length of 16–18 inches."

The statement that *insignis* has 10 ventral rays may be true, in which case it is of course distinct from *cristatus*; but such statements, never verified by any ichthyologist, are to be distrusted.

Pimelodus agassizii does not differ from *cristatus*.

The characters assigned to *P. ophthalmicus* are also present in one or another of the specimens examined. We have found the anal rays to vary from 12–15, and the dorsal in some is very much higher than in others.

The specimens in the museum are from San Gonçallo;

Avary; Villa Bella; Jutahy; Tapajos; Rio Mucuri; Tabatinga; Hyavary; Coary. The largest specimen examined is .34 m. long.

Body much depressed towards the caudal, elongate. Head conical, covered with thin skin, its greatest depth 1⅘ in its length; occipital crest narrow and long, reaching the comparatively large dorsal plate. A pore between the nasal openings, nearer the anterior.

Maxillary barbels extend sometimes to the beginning of the adipose, sometimes to near its tip; mental barbels thin, the distance between them greater than their distance from the postmental barbels, extending to the base of the pectoral; postmentals to middle of pectoral.

Eye large, 1⅘ to 2⅓ in snout, 4–5 in head, 1–1⅓ in interorbital region, 1½ to 1¾ diameters behind the rictus.

Mouth small, its width 3 in the head; teeth of the lower jaw in a shallow band which is interrupted in the middle and tapers backwards beyond the angle of the mouth. Teeth of the upper jaw in a narrow band, not deeper than the deepest part of the mandibulary band, sometimes interrupted in the middle.

Gill-membranes separate to below anterior margin of the eye; gill-rakers as long as pupil, 2–4+9–12.

Dorsal spine slender, with very fine notches behind and several large ones at the tip in front. Height of the spine and rays very variable, sometimes twice as high as the length of the fin. Dorsal spine midway between snout and anal. Adipose fin very long, 2½ in the length.

Caudal cleft to near its base; the upper lobe sometimes shorter than the head, sometimes as long as the head to tip of humeral process. Ventrals 1⅓–1⅔ in head.

Pectoral spine strong, 1⅓–1⅔ in the head, fine recurved teeth behind, and a few much larger recurved teeth near the tip. Caudal peduncle very broad, 2⅓–3 in head.

Head 5; depth 6; Br. 7; D. I, 6; A. 12–15.

109. Pimelodella wesselii.

Pimelodus (*Pseudorhamdia*) *wesselii* Steindachner, SB. Ak. Wien, lxxiv, Nov. 1876. Flussfische südöstl. Bras. iii, 56, foot note (Essequibo).

Pimelodella wesselii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 132, 1888 (Cudajas; Para; Marajo; Rio Madeira; Rio Puty; Santarem).

Habitat: Rio Puty to Rio Essequibo; Amazon from Para to Cudajas.

This species is very closely related to *cristatus*; when the color is obliterated they can scarcely be distinguished.

Body elongate, strongly compressed. Head rounded, obtusely conical, covered with very thin skin on the top; greatest width 1½ in its length, its greatest depth 1⅗; occipital crest striate, its greatest width 2½ to 3 in its length. Distance between covered with very thin skin, anterior and posterior nares 1½ in the eye.

Maxillary barbel reaching tip of adipose fin or beyond the tips of the middle caudal rays; mental barbels to base of pectoral; postmental about to tip of pectoral.

Eye 1½–1⅔ in snout, 4 in head, 1–1¼ in interorbital, 1 diameter behind the rictus.

Width of mouth 3 in head; teeth of the upper jaw slightly smaller than those of the lower, the width of the upper band 3½ in head.

Gill-membranes separate to below anterior portion of eye; gill-rakers about as long as diameter of pupil, 3+6–9.

Dorsal spine high and slender, very small recurved hooks on the upper half of both margins, its height 1–1¼ in head; highest rays about one-sixth longer than head; the dorsal spine inserted about midway between snout and anal. Adipose fin beginning immediately behind first dorsal, about 2⅓ in the length.

Caudal deeply forked, one of the rays sometimes produced in a filament, sometimes the upper, sometimes the lower lobe longer—always longer than head.

Anal rather high, the highest ray 1¾ in head, its tip not reaching the end of the adipose.

Ventrals inserted in front of the vertical from the last dorsal ray, their tips sometimes reaching to the anal, 1⅓–1⅖ in head.

Pectoral spine, much stronger than dorsal spine and usually shorter, 1¼ in head, with sharp recurved teeth behind and recurved notches in front.

Color light brown; a dark lateral band, sometimes continued on head.

Head 4½; depth 6; Br. 6; D. I, 6: A. 14.

110. Pimelodella gracilis.

Pimelodus gracilis Valenciennes, Voy. d'Orbigny, atlas ii, plate ii, fig. 5, 1847; Cuv. & Val. Hist. Nat. Poiss. xv, 181, 1840 (Buenos Ayres; Corrientes; Parana); Kner, SB. Ak. Wien, xxvi, 418, 1857 (Caiçara, Matogrosso; Rio Guaporé, Cujaba); Günther, Cat. Fish. Brit. Mus. v, 121, 1864 (copied).

Pimelodus (Pseudorhamdia) gracilis Steindachner, Flussfische Südamerika's, i, 9, 1879 (Orinoco near Ciudad Bolivar).

Pimelodella gracilis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 132, 1888 (Goyaz).

Habitat: Rivers from the La Plata to the Orinoco.

Twelve specimens from .11 m. to .17 m. in length. Goyaz, Brazil. Senhor Honorio.

Body slender, the width at the pectoral about equal to the depth, much compressed toward the tail. Head short, flat above, the profile slightly arched, the width of the head 1¼–1⅖ in its length; occipital process of the same width throughout, the sides parallel, its width 3½ in its length. Fontanel narrow, pointed in front and behind, reaching to the base of the occipital process, a bridge across it above the posterior part of the eye.

Eye round, 1⅗ in snout, 4 in head, its diameter slightly less than the interorbital.

Maxillary barbel reaching to tip of ventrals or to beginning of anal; mental barbels beyond base of pectorals, postmentals to tips of pectorals.

Lower jaw slightly shorter than the upper, the width at the rictus 2–2½ in the head. Intermaxillary band of teeth not wider than the mandibulary band at the symphysis.

Gill-membranes separate to below anterior margin of orbit. Gill-rakers 3+7.

Distance of dorsal spine from tip of snout equals its distance from the tip of the ventral rays, 3⅓ in the length; the height of the dorsal spine 1⅗–1⅔ in the head; highest ray equals the length of the head. Distance of the adipose from the dorsal fin equals the base of the dorsal or sometimes only half as long. Adipose fin 2⅓–2½ in the length.

Caudal broken in all the specimens.

Anal higher than long, the longest ray 1½ in head, its free margin rounded. Ventrals 1¼ in head.

Pectoral spine broad, minute teeth on its outer edge on the basal half, and notches near the tip; the inner margin with strong recurved teeth to near its tip; the height of the spine 1¼–1⅕ in head, the soft rays a little higher.

Color dark brown, everywhere with dark punctulations; a dark lateral band; the fins all punctate.

Head 5; depth 6–7½; Br. 7; D. I, 6; A. 12.

111. Pimelodella pectinifer.

Pimelodella pectinifer Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 132, 1888 (Campos).

Habitat: Rio Parahyba.

Body robust, compressed posteriorly; head conical, its width 1⅓ in its length, its depth at base of occipital process equal to its width.

Upper profile straight, curved in front of the eyes, head convex transversely. Lateral margins of occipital process concave. Distance between the nasal openings 1⅓ in eye.

Maxillary barbels not reaching to adipose fin. Mental barbels to base of pectorals, postmental to middle of pectorals. Gill-membranes separate to below anterior margin of eye.

Humeral process extending to middle of pectoral spine.

Eye 1½ in snout, 4 in head, nearer opercular margin than to snout.

Dorsal spine nearer snout than to the anal, its height 1⅓ in head; the highest ray about equal to the length of the head. Adipose fin 4 in the length, its distance from the dorsal equals three-fifths of its basis.

Caudal about 4 in the length. Free margin of anal rounded, the highest ray 1¾ in head.

Ventrals behind the vertical from the last dorsal ray, their tips one-third their length from the anal.

Pectoral spine equal to length of head, the tips of the rays one-half their length from the ventral.

Uniform light brownish.

Head 4¾; depth 5½; Br. 6; D. I, 6; A. 12.

Type: No. 7508 .19 m. Campos. Hartt & Copeland.

112. Pimelodella modestus.

Pimelodus modestus Günther, Proc. Zool. Soc. Lond. 28, 239, pl. x, fig. C., 1860 (Esmeraldas); id. Cat. Fish. Brit. Mus. v, 117, 1864 (Esmeraldas); id. Fish. Central America, 393, 1866 (Rio Chagres; Esmeraldas).

Pimelodella modestus Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. i, 133, 1888 (name).

Habitat: Rivers of Western Ecuador and Eastern Panama.

This species is known to us only from the plate and description by Dr. Günther.

113. Pimelodella elongatus.

Pimelodus elongatus Günther, Proc. Zool. Soc. Lond. 28, 238, pl. x, fig. B, 1860 (fresh waters of the Esmeraldas); Günther Catal. Fishes Brit. Mus. v, 118, 1864 (Esmeraldas).

Pimelodella elongatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. i, 133, 1888 (name only).

Habitat: Rivers of Western Ecuador.

This species is known to us only from the plate and description by Dr. Günther.

114. Pimelodella lateristriga.

Pimelodus lateristrigus Müller & Troschel, Horæ Ichthyol. iii, 3, 1849 (Brazil).

Pimelodus lateristriga Günther, Cat. Fish. Brit. Mus. v, 118, 1864 (Brazil); Hensel, Wiegm. Arch. 1870, i, 69 (Porto Alegre); ? Cope, Proc. Philad. Acad. Nat. Sci. 1872, 270 (Ambyiacu River); Lütken, Dan. Selsk. Skr. 1875, 171, fig. (Rio das Velhas); Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 45. (Rio Parahyba; Rio Doce; Rio Jequitinhonha; Cannavierias; Muriahé and Rio Janeiro); Vaillant, Bull. Soc. Philom. series 7, iv, 52, 1880 (Calderon).

Pimelodella lateristriga Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 133, 1888 (Santa Clara; Rio Mucuri; Rio Doce; Cannavierias; Sao Matheos; Mendez; Rio Trombetas; Obidos; Içа).

Habitat: Rivers emptying into the Atlantic north of the Rio Parahyba.

The specimens examined are from Santa Clara; Rio Mucuri; Rio Doce; Cannavierias; Sao Matheos; Mendez; Rio Trombetas; Obidos; Iça; in all more than one hundred specimens.

Body elongate, slender, considerably compressed posteriorly, head entirely covered with thin skin; fontanel narrow. Occipital process reaching to the dorsal plate, its margins nearly parallel.

Eye rather large, 1⅓–1½ in snout, 3½–3⅔ in length of head, the interorbital 1⅓ in the orbital diameter.

Maxillary barbel about to tips of ventrals and origin of adipose dorsal; mentals to edge of gill-membrane or about to base of pectorals.

Lower jaw little included; width of mouth at the rictus 2⅔–3 in head; teeth of the lower jaw in a narrow crescent; teeth of the upper jaw in a broad band, its depth 4 in its width; both bands interrupted in the middle.

Gill-membranes separate to below front of eye. Gill-rakers slender and short, 3+8.

Dorsal spine slender, roughened on its posterior margin, the anterior margin with notches at the tip, its height 1⅓ in the length of the head; the highest ray nearly equal to the length of the head. Dorsal spine nearer snout than to the anal fin. Base of adipose fin 3–4 in the length; its distance from the dorsal ⅔ its own length.

Caudal deeply forked, the lobes pointed, the upper lobe ⅓ longer than the lower, about 4 in the length.

Anal convex, the longest ray 1¾–2 in head.

Ventrals 1⅖ in head; scarcely reaching more than half way to the anal, inserted a little behind the vertical from the last dorsal ray.

Pectoral spine strong, unusually strong and sharp retrorse hooks along the inner margin; the outer margin roughened. The pectoral fin reaches to somewhere below the anterior half of the dorsal, not nearly to the ventrals.

Color light brown, a dark lateral band (obsolete in some specimens); fins with dark punctulations at their tips; the adipose fin narrowly margined with dusky. Dorsal and anal fins with the membrane thickened at the base, hyaline above.

Head 4–5; depth 6½–7; depth of caudal peduncle 2–2¾ in head. D. I, 6; A. 12.

The three specimens from Obidos and those from Iça, about eighty in number, are all very small, about .06 m. long. There is a trace of a lateral band, below which there is a broader silvery band. At the humeral region the abdominal wall is transparent. There are in some of these specimens traces of a dark line along the side of the head. They differ from specimens of *vittata* of the same size in the size of the eye, the slope of the head, the serration of the pectoral spine and the slenderness of the body. The pectoral spine with straight teeth along the anterior margin to near the tip; in the smallest specimens of *lateristriga* the serration on the anterior margin of the pectoral spine is entirely obliterated near the base and greatly reduced all along.

The maxillary barbels reach to the end of the adipose fin. The adipose fin is contained 3⅔ in the length; head 4 in the length; depth 5½.

115. Pimelodella harttii.

Pimelodus harttii Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 53 (Rio Parahyba).

Pimelodella harttii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 133, 1888 (name).

Habitat: Rio Parahyba.

This species is known only from the types.

116. Pimelodella buckleyi.

?*Pimelodus lateristriga* Cope, Proc. Acad. Nat. Sci. Philad. 1872, 270 (Ambyiacu River, near Pebas).

Pimelodus buckleyi Boulenger, Proc. Zool. Soc. Lond. March, 1887, 275, pl. xx, fig. i (Canelos).

?*Pimelodella buckleyi* Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 133, 1888 (Rio Parahyba; Macacos).

Habitat: Rio Parahyba; Amazon.

The specimens examined, five in number, measure from .13–.18 m. and are from the Rio Parahyba and from Macacos.

The type described by Boulenger differs from the specimens in the collection in having the pectoral spine "smooth on its inner edge;" in the longer postmental barbels which extend "to the extremity of the pectorals" and in the longer adipose fin which is "a little more than one-third of the total length (without caudal)." The specimens described below may represent a distinct species. See also description in the key.

Body robust, compressed posteriorly, head sub-conical, its width 1⅗ in its length; depth at the base of the occipital process 1½; width at the angle of the mouth 2⅔–3 in head. Profile decurved, a transverse section of the head convex, occipital process long and slender, its width at the base 3 in its length.

Maxillary barbel reaching beyond origin of the anal; mental barbel not reaching to the base of the pectoral, postmentals about to the middle of the pectoral.

Gill-membranes separate to below the anterior margin of the eye.

Eye $1\frac{1}{3}$–$1\frac{1}{2}$ in snout, $3\frac{1}{3}$–4 in head, equidistant from snout and posterior margin of opercle; interorbital $1\frac{1}{3}$ in eye.

Dorsal spine equidistant from snout and anal, its height $1\frac{1}{3}$ in head, the longest rays equal to the head in length.

Adipose dorsal $3\frac{2}{5}$–4 in the length, its distance from the dorsal fin equals the base of the latter.

Caudal lobes of equal width, the upper longer, 4 in the length. Anal rounded, its longest rays $1\frac{1}{2}$–$1\frac{4}{5}$ in head.

Ventrals inserted behind the vertical from the last dorsal ray, $1\frac{1}{3}$–$1\frac{3}{5}$ in head, their tips about $\frac{1}{4}$ of their length from the anal.

Pectoral spine little less than the head in length.

Color, light brown; a dusky lateral band; tips of the fins dusky.

Head $4\frac{1}{2}$–5; depth $5\frac{1}{2}$–$6\frac{1}{2}$; Br. 7; D. I, 6; A. 12–14.

117. Pimelodella vittata.

Pseudorhamdia vittata (Kröyer) Lütken, Velhas Flodens Fiske Vidensk. Selsk. Skr. 1874, 34 (Rio das Velhas); id. l. c. 1875, 173, fig. (Rio das Velhas).

Pimelodella vittata Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 133, 1888 (Rio San Francisco; Minas Geraes; Sao Matheos; Rio Jequitinhonha).

Habitat: Streams of Minas Geraes and Bahia emptying in the Atlantic.

Thirty-five specimens. Rio San Francisco; Minas Geraes; Sao Matheos; Rio Jequitinhonha.

Elongate, compressed posteriorly. Head rather broad, its width $1\frac{1}{3}$ in its length, at the rictus $2\frac{1}{3}$, the depth at base of occipital process $1\frac{1}{2}$ in its length; profile convex longitudinally, strongly convex transversely.

Occipital process scarcely extending to the dorsal plate.

Teeth in bands of equal depth in both jaws, the width of the intermaxillary band 3⅓ in the length of the head.

Eye 1½ in the snout, 4 in the head, about equal to the interorbital space, 1 diameter behind the rictus.

Maxillary barbels extending to the adipose fin, mental not to base of pectoral fin, postmental to middle of pectoral.

Gill-opening not extending forward beyond anterior margin of eye. Humeral process reaching about to middle of pectoral spine.

Dorsal spine nearer end of snout than to the anal fin, slightly rough on posterior margin, recurved notches near the tip in front, its height 1⅖–1½ in the head; highest dorsal ray about equal to length of head. Adipose fin 3¼ in the length, its distance from the dorsal fin ⅗ the length of its base.

Caudal deeply forked, the upper lobe longer, 3½ in the length. Anal rounded, 1⅗ in the head. Ventrals inserted behind the vertical from last dorsal ray, reaching about ⅔ the distance toward the anal fin.

Pectoral spine terete, curved, 1–1¼ in the head, the rays somewhat longer reaching to below anterior half of the dorsal fin.

Depth of caudal peduncle about 3 in the head.

Brownish, a dark band along middle of sides extending forward to the snout, sometimes not evident on the head in alcoholic specimens; tips of the fins dusky; basal portion of the dorsal membrane thickened, the remainder hyaline.

Head 4½; depth 6–7; D. I, 6; A. 12.

118. Pimelodella chagresi.

Pimelodus (*Pseudorhamdia*) *chagresi* Steind. SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 34 (Rio Chagres and its tributary near Obispo).

Pimelodella chagresi Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 134, 1888 (Obispo River).

Habitat: Rio Chagres and its tributaries.

We have examined two specimens from the Obispo River, Panama, .146 m. and .12 m. They were collected by Dr. Steindachner, Hassler Expedition, in 1872, and are probably two of the four type specimens.

Body elongate, slender, much compressed posteriorly; greatest width of head about 1⅖ in its length, its depth at base of occipital process 1½; width of snout at the rictus about 2½. Profile curving very gently from origin of the dorsal fin to the posterior nostrils, thence abruptly decurved. The fontanel forms a depression between the eyes, otherwise the interorbital is flat; postorbital convex transversely.

Teeth in bands of about equal width in both jaws, interrupted in the middle in the lower jaw, the width of the intermaxillary band 3⅔ in the head.

Occipital process reaching quite to the dorsal plate, articulating with it, the process notched at its tip to receive the dorsal plate.

Eye 1⅖–1⅔ in snout, 3⅔ in head, the interorbital about one-sixth less than the diameter of the eye.

Maxillary barbels extending to origin of adipose fin and tips of ventrals, mental about to base of pectoral, and postmental barbels to middle of pectoral fin.

Gill-membranes meeting under anterior portion of eye. Humeral process about to middle of pectoral spine.

Dorsal spine inserted nearer the tip of the snout than to the origin of the anal fin; straight, scarcely roughened in front except near the tip, where there are several notches, its posterior margin with very short teeth along the basal portion in the larger—perfectly smooth in the smaller specimen, with short notches near the tip in both; dorsal spine 1½–1⅖ in head, the first ray very nearly as high as length of head, the base of the fin less than its height.

Adipose fin 3½–3⅔ in the length; in the larger specimen the space between the beginning of the adipose fin and end of first dorsal is $1\frac{1}{2}$ in the base of the adipose, while in the smaller specimen it is nearly 2.

Caudal $3\frac{1}{3}$–$3\frac{2}{5}$ in the length, deeply forked, the upper lobe much longer than the lower, pointed; lower lobe rounded. Anal $1\frac{2}{5}$ in head.

Ventrals inserted immediately behind the vertical from last dorsal ray, their tips reaching the beginning of the adipose, one-fourth their length from the origin of the anal fin.

Pectoral spine flat, $1\frac{1}{5}$–$1\frac{2}{5}$ in head, the rays a little longer. Depth of caudal peduncle 2–$2\frac{1}{4}$ in head.

Color brown above, sides lighter, ventral surface white; a well defined dark brown band from tip of snout to caudal, continued on middle caudal rays, widest on shoulder; the dorsal fin with a narrow dark bar on the membrane close in front of each ray and parallel with it; adipose dorsal very narrowly margined with dark; caudal dusky; pectorals, ventrals and anal with very minute punctulations on the margins of the rays.

Head $4\frac{1}{2}$–$4\frac{4}{5}$; depth 5–6; D. I, 6; A. 11 or 12.

119. Pimelodella brasiliensis.

Pimelodus (*Pseudorhamdia*) *brasiliensis* Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 50, pl. vii (Rio Parahyba).

Pimelodella brasiliensis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 133, 1888 (name).

Habitat: Rio Parahyba.

This species, if the characters assigned to it will prove constant, is the most aberrant of the genus. It is known from a single specimen.

XXI. PIMELODUS.

Pimelodus Lacépède, Hist. Nat. Poiss. v, 1803 (species of several genera).

Pimelodus Cuvier, Règne Animal, ii, 203, 1817 (species having a single band of teeth in the upper jaw).

? *Pimelodus* Swainson, Fish. Amph. & Rept. ii, 305, 1837 *(quadrimaculatus).*

Pimelodus Lütken, Velhas Flodens Fiske, 43, Vidensk. Selsk. Skr. xii. 2, 163, 1875 *(maculatus = clarias).*

Pseudariodes Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 99 *(clarias).*

Pseudorhamdia Bleeker, l. c. 101 *(maculatus = clarias).*

Pseudorhamdia Lütken, l. c. 49, 169, 1875 *(fur).*

Type *Pimelodus maculatus* Lacépède.

Bleeker, assuming that the first species mentioned by Lacépède under *Pimelodus* was the type of *Pimelodus*, restricted the genus *Pimelodus* to the *Silurus bagre* Bloch. There is, however, no evidence that the first species mentioned by Lacépède was his type of *Pimelodus*, and as Cuvier restricted the name to those "qui ont des dents en velours aux deux mâchoires, mais où la supérieure n'en a qu'une band intermaxillaire," the type of the genus must be selected from among them. In 1839 Swainson restricted the genus to *quadrimaculatus*, one of the species enumerated by Cuvier, and also included in the *Pimelodus* of Lacépède.

The genus *Pimelodus* must therefore have for its type *Silurus quadrimaculatus* Bloch, whatever that may be.

In 1861 Gill restricted the name *Pimelodus* with *maculatus* as its type.

Lütken also proposes *maculatus* as the type. He also restricted the name *Pseudorhamdia* Bleeker to *fur*, a species entirely unknown to Bleeker. Still more inexcusable is the restriction of Steindachner of the same name to still another species not belonging to this genus.

If we disregard the many synonyms, the genus is composed of well-defined species inhabiting the region north of the Rio Plata and east of the Andes.

Teeth on the vomer in small patches or none; teeth on the pterygoid in one species, otherwise the palate edentulous. Fontanel not extending backward beyond the eyes. Humeral process broad, not spine-like. Crown of head granulose; in one species covered by very thin skin. Dorsal I, 6. Dorsal and pectoral spines stout.

DOUBTFUL SPECIES OF PIMELODUS.

119.1. *Rhamdia cyanostigma* Cope, Proc. Am. Philos. Soc. 11, 569, 1870 (Pebas, Ecuador).

We are unable to tell to which genus this species belongs. Dr. Cope says (Proc. Am. Philos. Soc. 1878, 675), that this species is allied to *Pimelodus ophthalmicus* =*Pimelodella cristatus*. But *cristatus* is generically different from *Rhamdia*, and was generally considered so when the statement was made.

Top of head smooth or with a slight rugosity on the postfrontal region. Depressed dorsal not reaching adipose fin. Pectoral reaching ⅔ to ventral, ventrals ½ to anal. Caudal deeply forked, the lobes equal. Maxillary barbels reaching to near the end of the adipose fin. Color plumbeous; head above blackish, with an irridescent blue spot above the posterior margin of the orbit on each side.

Head less than 5 in the length; depth 7⅓; adipose fin 3⅓; D. I, 6; A. 12.

119.2. *Silurus quadrimaculatus* Bloch, Ausländ. Fische, part 8, 37, plate 368, 1794 (America); Cuv. & Val. Hist. Nat. Poiss. xv, 185, 1840 (America).

Adipose fin long, covering almost the entire postdorsal region. Head flat, opercles granular. Palate rough. Maxillary barbels as long as the entire fish. Vent equidistant from snout and caudal. Only the pectoral spine stiff, and with teeth. Body brown with violet reflections, ashy below, fins yellowish. Br. 5; D. 7; A. 9.

Bloch says nothing in his description about the four fantastical spots of his figure. Perhaps the spots were placed there to have the fish agree with its name.

ANALYSIS OF THE SPECIES OF PIMELODUS.

a. Head granulated, entirely naked above.

b. Length of adipose dorsal 3⅓ in the length or shorter; caudal rays not produced, not much longer than head; maxillary barbels not extending much beyond tips of caudal, mostly much shorter.

c. Intermaxillary band of teeth present.

d. Anal rays 11 to 13; adipose dorsal longer than base of anal.

e. Caudal obliquely rounded, the lower rays much the longer; occipital crest as wide as long, its tip deeply forked, receiving dorsal plate in its notch; anal narrowly rounded. *eques* 120.

ee. Caudal deeply forked.

f. Anal rounded. Intermaxillary band of teeth twice as wide as the mandibulary band. Snout projecting. *ornata* 121.

ff. Anal emarginate, some of the first rays extending beyond the tips of the last. Intermaxillary band of teeth scarcely broader than the mandibulary band.

g. Teeth on pterygoids usually present; the vomerine patches of teeth reduced to a minimum or absent.

h. Teeth on the vomer, none on the pterygoids; head rather broad, flattish, granulose; eye small, 7-9 in head. *albicans* 122.

hh. Minute patches of teeth on vomer or none; pterygoid teeth usually present; eye large.

i. Caudal with brown bars. *pictus* 123.

ii. Caudal without brown bars. *clarias* 124.

gg. No teeth on vomer or pterygoids.

j. Lips thin, normal; body thickly covered with black spots. Dorsal spine ¼ longer than head; adipose dorsal longer than head. Maxillary barbels reaching past anal, mental barbels past middle of pectorals; postmental past base of ventral. Eye 3 in snout, 6¼ in head. Lower jaw included; depth of intermaxillary band of teeth 4 in its width. Opercle ⅓ longer than the diameter of the eye. Pectoral plate elongate, subelliptical, its width 3⅓ in its length. Caudal lobes pointed, the upper longer than head. Adipose dorsal about 3⅓ in the length. Pectoral spine about equal to the head in length. (Steindachner.) *grosskopfii* 125.

jj. Lips very thick; teeth on intermaxillaries in a very short band. Head pointed, almost conical, granulated to near posterior nostrils. Maxillary barbel extending to near tip of caudal, sometimes shorter. Eye midway between posterior nasal opening and gill-opening, more than 5 in head, less than two in interorbital. Mouth very narrow. Dorsal spine serrate behind, as high as the length of the adipose dorsal; pectoral spine serrated on both edges, 1⅓ in length of head. Uniform dark above, lighter below. (Lütken.) *labrosus* 126.

dd. Anal rays 17. Adipose dorsal equals anal. Body rather high and compressed; head depressed; profile straight; width of the head 2⅓ in its length. Eye 6 in length of head, 2 in interorbital. Upper jaw somewhat projecting; teeth in both jaws in shallow and narrow bands. Maxillary barbel to anal; post-mental barbels to ventrals; mentals slightly shorter. Dorsal spine serrate behind, little shorter than the pectoral spine which is serrated on both margins; pectoral spine 1⅕ in head. Head 4¼ in total length; depth 5⅓. D. I, 6. A. 17. (Lütken.) *valenciennis* 127.

cc. Intermaxillary teeth none; snout long, sub-conical, lips broad; mouth small. Eye 5 in head; interorbital area little narrower than eye; dorsal spine serrated behind, shorter than head; pectoral spine 1⅗ in head. Adipose dorsal 4 in the length; maxillary barbels to caudal; mental barbels to gill-opening; postmental to pectoral. Head 4; depth 5⅓; D. I, 6; A. 12 or 13. (Lütken.) *westermanni* 128.

bb. Length of the adipose fin 2⅖–2⅘ in the length; caudal lobes produced, twice as long as head; maxillary barbels extending much beyond tips of caudal. *altipinnis* 129.

aa. Head granulated above but covered with a very thin skin; upper anterior half of body with dark spots; anal emarginate. *fur* 130.

120. Pimelodus eques.

Pimelodus eques Müller & Troschel, Schomburgk Brit. Guiana, 628, 1848 (in all rivers of Guiana); Müller & Troschel, Horæ Ichthyol. iii, 5, 1849 (Guiana); Günther, Cat. Fish. Brit. Mus. v, 116, 1864 (copied); Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. v, 99 (Amazon near Fonteboa; Teffé; Obidos; Villa Bella; Jose Fernandez; Xingu; Tonantins; Hyutahy; Lake Hyanuary); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 134, 1888 (localities mentioned by Steindachner).

Habitat: Brazilian Amazon and its tributaries and northward.

The flat head and peculiar shape of the occipital crest, the shape of the anal, etc., distinguish this from all other related species.

Body not as wide as deep at the shoulders, compressed towards the caudal; head flat, depressed, its greatest width 1¼ in its length, its greatest depth about 2½. Entire upper portion of head granulose or striate; fontanel continued as a narrow groove to the occipital crest. Tip of occipital crest emarginate, articulating with the shield-shaped dorsal plate. Distance between the nostrils equal to ⅔ the diameter of the eye.

A deep groove from maxillary barbel to below eye, the barbel reaching in No. 7574 beyond the caudal, in the longest specimen, No. 7478, to the base of the adipose dorsal; postmental barbels inserted behind and outward from the mentals; mental barbels extending to base of pectorals, slightly shorter in adult; postmentals not to tip of pectoral.

Eye large, 5 to 6 in the head, 2 to 2½ in the snout, 1½–2 in interorbital region, 1½ diameters behind the rictus.

Jaws subequal, the upper a little longer; width of the mouth 2½ in length of head; both lips papillose; teeth of the lower jaw in a band equal to ⅕ the diameter of the eye in depth, tapering to behind the rictus; a broad papillose membrane behind it which is not much broader at the rictus; teeth of the upper jaw in a band scarcely deeper than the band of the lower jaw, not interrupted at the middle; the band of the lower jaw broadly interrupted at the middle; chin and snout with numerous pores.

Gill-membranes separate to nearly underneath the rictus; gill-rakers overlapping, 2+12, in a single series on the first two arches, the inner series being replaced by a scalloped membrane.

Dorsal spine rather weak, 1⅗ in head, the highest ray 1⅖ in head, the free margin of the fin rounded; the basal fulcrum strong, the spine inserted forward of the middle between base of pectoral and of ventral fins, equidistant from snout and beginning of the anal fin. Adipose fin long, 3–3½ in the length. Caudal fin obliquely rounded. the lower portion longer, 1¼ in head.

Anal with its free margin narrowly rounded, the eighth ray highest, 2 in head, the base of the fin equal to two-thirds its height. Ventrals 1⅔ in head.

Pectoral spine very strong and long, scarcely shorter than the rays, $1\frac{2}{5}$ in head; strong extrorse teeth on the anterior and retrorse on the posterior edge of the spine.

Depth of caudal peduncle $3\frac{1}{3}$ in length of head.

Color brownish marbled with darker; gill-membrane broadly edged with white, in front of which is a black bar; a large black spot on shoulder sometimes continued across the back in front of the dorsal spine and as a lateral band to the caudal; base of caudal dark brown; fins dusky, spotted with darker.

Head $3–3\frac{3}{5}$; depth 5; Br. 7. D. I, 6; A. 11.

Twenty-three specimens .13–.30 m. Tonantins; Fonteboa; Jose Fernandez; Jutahy; Xingu; Obidos; Lake Hyanuary; Teffé; Villa Bella.

121. Pimelodus ornata.

Pimelodus ornatus Kner, SB. Ak. Wien. xxvi, 411, fig. 18, 1857 (Surinam; Rio Negro; Cujaba); Günther, Cat. Fish. Brit. Mus. v, 116, 1864 (River Capiu; Para); Peters, MB. Ak. Berlin, 470, 1877 (Calabozo); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 134, 1888 (Goyaz).

Pseudorhamdia ornata Bleeker, Silures de Suriname, 77, 1864 (Surinam).

Silurus megacephalus Natterer in Kner, l. c.

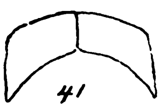
Habitat: Brazilian Amazons and tributaries and the region northward.

Body slender, elongate. Head depressed, flat above, its depth at base of occipital process $2\frac{1}{2}$ in its length, its greatest width $1\frac{1}{2}$; fontanel wedge-shaped, its broad end above the posterior margin of the orbit; occipital process comparatively slender, its width at the tip less than half its greatest width which is $1\frac{1}{2}$ in its length.

Eye large, 2 in snout, $1\frac{1}{2}$ in head, $1\frac{1}{2}$ in interorbital.

Maxillary barbel reaching to below adipose fin; postmentals a little beyond base of pectoral.

Snout depressed, elongate, subspatulate, the upper jaw projecting beyond the lower. Intermaxillary band of



teeth very deep, its depth 4 in its width; mandibulary band of teeth at the symphysis about one-half as wide as the intermaxillary band. Gill-rakers 4+10.

Distance of dorsal spine from snout 2½ in the length, the spine high and slender, 2 in head; its anterior margin smooth, the posterior margin verrucose. Distance of adipose fin from the dorsal equal to the length of the dorsal. Adipose fin 5½ in the length.

Pectoral spine about 2 in head, its anterior margin with short blunt teeth, the posterior margin with long teeth.

Head 3½; Br. 9–10; D. I, 6; A. 13.

A single specimen in poor condition .18 m. Goyaz.

122. Pimelodus albicans.

Arius albicans Valenciennes, Voy. d'Orb. pl. iii, fig. 2, 1847.
Arius albicans Cuv. & Val. Hist. Nat. Poiss. xv, 80, 1840 (Buenos Ayres).
Piramutana albicans Günther, Annals & Mag. Nat. Hist. 1880, 9 (Rio Plata).
Arius moroti Valenciennes, Voy. d'Orb. 6, 1847 (La Plata).
Pimelodus albicans Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 134, 1888 (La Plata).
Habitat: Rio Plata.

Dr. Günther is the first to have rediscovered this species. All the specimens referred to *albicans* by Lütken, Steindachner and others belong to *P. clarias.*

As Valenciennes and Günther state, this species has no teeth on the pterygoids; it always has teeth on the vomer. In the smallest and largest specimens examined they are present on one side only. It is further distinguished by its small eye and depressed head.

The vomerine teeth are scarcely sufficient to separate this species from *Pimelodus* generically.

Head rather broad, granulose. Eye small 3½–4½ in snout, 7⅓–9 in head, 2⅔–3 in interorbital, 1 in internasal space.

Maxillary barbels reaching to middle of anal, mentals to base of pectoral, postmentals to tips of pectorals.

Width of mouth $2\frac{1}{3}$–$2\frac{2}{3}$ in length of head; lower jaw included. Depth of intermaxillary band of teeth 5–6 in its width.

Opercle twice as long as the eye. Humeral process broad, pointed.

Caudal lobes acute, the upper lode $\frac{1}{3}$–$\frac{1}{5}$ longer than the head.

Dorsal spine $1\frac{1}{6}$–$1\frac{2}{7}$ in head; adipose dorsal shorter than the head. Pectoral spine $1\frac{1}{6}$–$1\frac{2}{5}$ in head.

Color uniform brownish, the young with traces of longitudinal stripes.

Four specimens, the largest .50 m. Buenos Ayres.

123. Pimelodus pictus.

Pimelodus pictus Steindachner, SB. Ak. Wien. lxxiv, 1876. Ichthyol. Beiträge, v, 96 (Peruvian Amazon; Hyavary). Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 134, 1888 (Hyavary).

Habitat: Marañon.

Profile steep, convex, interorbital region flattish; postorbital portion of the head strongly convex in transverse profile; occipital process keeled. Bones of the head granular.

Entire intermaxillary band of teeth projecting; vomer with small patches of teeth.

Eye $3\frac{1}{2}$ in head, $1\frac{1}{3}$ in the snout; $1\frac{1}{5}$ in the interorbital.

Maxillary barbels reaching a little past the base of the adipose or to the caudal; mental barbels reaching the base of the pectoral ; post mentals to the tip of the pectorals.

Distance of the dorsal spine from the snout $2\frac{1}{2}$ in the length. Dorsal spine as long as the head, serrated on its posterior margin, slightly so near the tip in front, finely granular below. Distance of the adipose fin from the dorsal fin equals the length of the adipose fin which is 6 in the length.

Caudal deeply forked, longer than the head.

Pectoral spine strongly serrated on both margins, the serrations on the inner margin a little stronger; the spine a little shorter than the head. Pectoral pore present; humeral process triangular, pointed behind and reaching a little behind the middle of the pectoral spine, its surface granular-striate.

Silvery below, becoming brownish above; indistinct darker markings on the back. Dark spots on the bases of the dorsal rays, membrane of the dorsal transparent, the tips of the rays brown, a brown spot between the first and second rays in one of the specimens. A brown spot at the tip of the adipose fin. Two dark spots at the base and two or three brown bars on the lobes of the caudal; other fins plain white.

Head $3\frac{5}{6}$; D. I, 6; A. 11.

Two specimens .075–.085 m. Hyavary. Bourget.

124. Pimelodus clarias.

Silurus clarias Bloch, plate 35, fig. 1-2=*Silurus clarias* Linnæus in part; not *Silurus clarias* Hasselquist which is *Synodontis clarias* from the Nile.

Pimelodus clarias Lacépède, Hist. Nat. Poiss. v, 93, 1803 (? 8 dorsal rays); Castlenau, Amin. Nouv. Amér. Sud, 34, 1855 (Crixas; Araguay, Ucayale; Amazon); Steindachner, Fish-fauna Magd. Stromes, 15, 1878 (Magdalen River); Steindachner, Flussfische Südamerikas, i, 10, 1879 (Orinoco near Cuidad Bolivar), 14 (Mamoni River near Chepo); Steindachner, Flussfische Südamerikas, iv, 4, 1882 (Rio Huallaga); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 134, 1888.

Bagrus (Ariodes) clarias Müller & Troschel, Schomburgk Brit. Guiana, 627, 1848 (Waina Barima).

Ariodes clarias Müller & Troschel, Horæ Ichthyol. iii, 10, 1849 (British Guiana); Kner, SB. Ak. Wien, xxvi, 1857, 413.

Pseudariodes clarias Bleeker, Nederl. Tijdschr. Dierkunde, i, 99, 1863 (name only); Lütken, Meddel. Nat. Hist. Forening, 1874, Nos. 1 & 2, pages 194 & 199 (Guiana).

Silurus callarias Bloch & Schneider, "Syst. Ichthyol. in part, 379, 1801."

Pimelodus maculatus Lacépède, Hist. Nat. Poiss. v, 94 and 107, 1801 (Rio Plata); Valenciennes, Voy. d'Orbigny, ix, Atlas ii, plate i, figs. 1-3, 1847 (La Plata to Mexico, Lake Maracaibo); Cuv. & Val. Hist. Nat. Poiss. xv, 192, 1840 (Cayenne; Maracaibo); Schomburgk, Fishes of Guiana, part i, 175, 1841 (Rivers of Guiana generally; Rio Negro; Amazon); Steindachner, SB. Ak. Wien, lvi, 1867, Ichthyol. Notiz. vi, 32 (La Plata); Steindachner, SB. Ak. Wien, lx, 1869, Ichthyol. Notiz. ix, 6 (Montevideo); Hensel, Wiegm. Arch. 1870, i, 69 (Jacuhy); Lütken, Dan. Selsk. Skr. 163, fig. 1875 (Rio das Velhas); Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstlichen Brasiliens, iii, 40 (La Plata; Rio San Francisco; Rio das Velhas; Amazon between Para and Santarem; Rio Grande do Sul; Porto Alegre); Peters, MB. Ak. Berl. 470, 1877 (Calabozo).

Pimelodus rigidus Spix, Gen. et Spec. Bras. plate vii, fig. 2, 1829.

Pimelodus blochii Cuv. & Val. Hist. Nat. Poiss. xv, 188, 1840 (Cayenne; Surinam).

Piramutana blochii Günther, Cat. Fish. Brit. Mus. v, 111, 1864 (copied); Vaillant, Bull. Soc. Philom. series 7, iv, 152 (Calderon).

Pimelodus arekaima Schomburgk, Fish. Brit. Guiana, i, 178, plate not descr. 1841 (Essequibo).

Mystus ascita Gronow, "ed. Gray 156."

Pseudorhamdia ascita Bleeker, "Versl. & Meded. Acad. Wet. Amsterd. 1862, 384."

Pimelodus macronema Bleeker, Silures de Suriname, 79, plate 14, 1864 (Surinam).

Pseudariodes albicans Lütken, Meddel. Nat. Hist. Foren. 1874, Nos. 1 and 2, pages 194 and 198, not *Arius albicans* of Valenciennes (La Plata and its tributaries); Steindachner, Fisch-Fauna Magdalenen Stromes 61, note, 1878.

Pseudariodes pantherinus Lütken, Meddel. Nat. Hist. Forening. 1874, Nos. 1 and 2, pages 192 and 199 (Venezuela).

Pseudorhamdia piscatrix Cope, Proc. Am. Philos. Soc. xi, 569, 1870 (Pebas); id. Proc. Philad. Acad. 1872, 262 (Ambyiacu River); id. Proc. Am. Philos. Soc. xvii, 674, 1878 (Peruvian Amazon).

Piramutana macrospila Günther, Annals & Mag. Nat. Hist. July, 1880, 10, plate ii (Rio Plata).

Habitat: Rio Plata and region to the north of it and east of the Andes.

There seems to have been considerable confusion in the nomenclature of this species, owing to its great variability, and for other reasons.

Linnaeus had two species, this and one from the Nile. Bloch figured the American species, while he gave as a synonym the Nile species. His figure should restrict the name *clarias* to the American form; he probably copied his synonymy.

Cuvier and Valenciennes restrict the name *clarias* to the Nile species, and propose the name *blochii* for the American form.

Müller and Troschel first identified this species with *Arius albicans* Valenciennes; they were followed by Günther in his Catalogue; and Steindachner in Süsswasserfische südostl. Bras. iv. Bleeker next supposes he has a new species from Surinam allied to *maculatus*, and names it *macronema*.

Lütken next gives the differences between what he supposes are *albicans* and *clarias*. As Dr. Günther has shown (Annals and Mag. Nat. Hist. 1880, 10), his *albicans* was not *Arius albicans* Valenciennes. Lütken also described a new species, *pantherinus*, from Venezuela, and argues that the northern and southern forms are distinct; he did not have specimens from the Amazon.

Dr. Steindachner (Fisch-Fauna des Magdalenen Stromes, 15) says that this species *(clarias)* is equally abundant in the Magdalen River, the Orinoco, the Amazon and the Rio Plata. He identifies *albicans*, *pantherinus* and *macronema* with *clarias*. He has examined thirty-six specimens from the Rio Magdalena which are all unspotted and have no teeth on the vomer, and frequently the pterygoid teeth are absent; the only constant character being the black spot at the base of the dorsal spine. The specimens described by Kner belong to the variety *pantherinus*. "Mit Rücksicht auf das Längenverhältniss der Fettflosse zur Dorsal und Anal;" könnte diese Art "wieder in drei künstliche Arten zersplittert werden." But later (page 61) in the same paper, in a note, Dr. Steindachner states that since the above was written he has received a specimen of the *albicans* Lütken (not of Valenciennes), and that it is distinct from *clarias*, and more closely related to *maculatus* than to *clarias*.

The *piscatrix* Cope, and *macrospila* Günther, should also be referred to this species.

The *Mystus No. 84* Gronow was referred successively by Valenciennes to *clarias*, by Günther to *maculatus*, and by Bleeker to *macronema*.

GENERAL DESCRIPTION.

Body robust, especially in older specimens; head conical, its greatest depth 2, its greatest width 1½ in its length; the ossification of the head exposed, granular; occipital process arched transversely, its width at the base ⅔ its length.

Maxillary barbel, terete extending beyond the tips of the dorsal; mental and postmental barbels almost equidistant from each other, the mentals about reaching to the pectoral; the postmentals beyond the middle of the pectorals.

Mouth moderate, its width at the angles 2½ to 3⅓ in the length of the head; the lower jaw is included, the upper bordered by a broad lip.

Teeth in lower jaw in bands which taper to a point behind the rictus, interrupted in the middle; teeth of the upper jaw in a narrow uninterrupted band; sometimes minute patches of teeth on the vomer, sometimes larger patches on the pterygoid bones.

Gill-membranes separate to in front of eye; gill-rakers 6+19.

Adipose dorsal short, 3½ to 5½ in the length.

Caudal divided to near its base.

Anal emarginate, the fourth ray highest, extending beyond the tip of the last ray.

Ventrals short and broad, extending ½ of their length beyond the vent.

Pectoral spine roughened in front, strong recurved teeth behind.

Depth of caudal peduncle $2\frac{3}{5}$ to 3 in head.

Head $3\frac{1}{2}$ to $4\frac{1}{2}$; depth $3\frac{4}{5}$ to 5; Br. 9; D. I, 6; A. 11.

We have examined about four hundred specimens of this species, some of which have teeth on the vomer and some have not. Some have teeth on the pterygoid and some have not; some have the sides thickly covered with small spots *(pantherinus)*; some have the sides covered with from three to five series of large spots *(macrospila)*; some have the sides plain *(macronema, piscatrix)*; some have three or four black bands along the sides; some have long maxillary barbels, and some have shorter ones; some have a long or shallow band of teeth on the intermaxillary, and some have a deeper, shorter band; some have a black spot at the base of the dorsal plate and some have not. They are labelled *Pimelodus maculatus*. It seems that the species *Pimelodus maculatus* Auct. goes through a similar variation of color and other characters. The *maculatus* has been confounded with *clarias* by Kner, Steindachner (as shown by the labels), and Lütken, and in fact the only difference between the two species is the presence of teeth on the pterygoids and vomer in the one and their absence in the other; and when these teeth in *clarias* are absent, as they sometimes are, it cannot be distinguished from *maculatus*, and *maculatus*, with all its synonyms, may be placed in the synonymy of *clarias*.

We should perhaps state in this connection that we have examined almost every specimen in the museum at least four times, that we have several times separated the material according to the variation of the different parts, and that we have been enabled to separate the material into several varieties, some of which have not yet been described.

As already stated *Arius albicans* is a distinct species.

We add here descriptions of the more striking varieties represented in the museum. We have not made any reference to the teeth, as they are such a variable quantity in all the varieties. The variety with plicate lips *(maculatus?)* seems to be more frequently destitute of teeth on the vomer than the others. Intermediate forms between all of these varieties are in the collection.

124a. Lips distinctly plicate; maxillary barbel extending to base of anal, or slightly longer; mental barbels about to base of pectoral fin; postmental past middle of pectoral; mentals and postmentals compressed.

Eye $2\frac{1}{3}$–$2\frac{2}{3}$ in snout, 5–$5\frac{3}{4}$ in length of head, $1\frac{1}{2}$–$1\frac{3}{4}$ in interorbital.

Width of mouth about 3 in head; the teeth of the upper jaw scarcely projecting beyond the lower; depth of the intermaxillary band of teeth $4\frac{1}{4}$–$4\frac{1}{2}$ in its width.

Distance between anterior and posterior nasal openings about equal to the eye.

Opercle scarcely longer than the diameter of the eye.

Pectoral plate elongate, subelliptical, its width about 3 in its length.

Caudal lobes pointed, the upper longer than the head.

Adipose dorsal 4–$4\frac{1}{2}$ in the length.

Dorsal spine about equal to the head in length; pectoral spine $1\frac{1}{5}$–$1\frac{1}{2}$. Ventral fin $1\frac{1}{3}$–2 in head.

Body with four or five rows of large brown spots; spots on head; sometimes the spots are much smaller and irregularly scattered.

"Lacépède described his *Pimelodus maculatus* after Commerson who had specimens from the Rio Plata." (Val.) The specimens in the museum agree closely with the description given by Valenciennes and the figure by Lütken in Velhas Flodens Fiske, page 165; they are from the Rio das Velhas; Uraguay; Giquitiba; Rio Grande and Buenos Ayres.

About twenty specimens from Goyaz represent a variety intermediate between this and the next. They have the lips not plicate, the maxillary barbel extending not quite to the caudal, the humeral plate angulated above; numerous spots on head and body.

Six other specimens from the Rio Grande do Sul, Emperor's collection. Some of these have three series of spots, others have six or seven rows covering the sides. Two have teeth on the pterygoids.

124b. Dorsal spine shorter than head; pectoral plate subrhomboidal, its upper and its posterior margins concave, decided angle between the two faces.

Caudal lobes long and pointed, the rays normal; upper lobe longer than head.

Maxillary barbel long, reaching to or beyond base of caudal; mentals beyond base of pectorals, postmentals beyond base of ventrals.

Eye 1⅓ in snout, 3 to 3½ in head, 1¼–2 in interorbital.

Mouth at the angle, about equal to snout, 2⅓–2¾ in head; a portion of the intermaxillary band of teeth projecting beyond the lower jaw; its depth about 4–6 in its width; distance between anterior and posterior nares 1½ in eye.

Opercle narrower than eye, its length 1⅓–1½ in the diameter of the eye.

Humeral process more angular and more slender than in any other variety.

Adipose dorsal about 5 in the length.

Dorsal spine very nearly equal to the head in length; pectoral spine 1⅓ in head, ventral fin 1⅓.

Color silvery, marked with brown; head vermiculated with brown; body with about four longitudinal bands of brown, sometimes more or less broken up into spots; a dark spot at base of dorsal spine; adipose dorsal spotted with brown; dorsal with smutty tips; other fins plain. Color sometimes uniform.

This variety is the one commonest in the Amazon system. The museum contained specimens from Para; Porto do Moz; Santarem; Obidos; Villa Bella; Coary; Teffé; Fonte Boa; Tabatinga; Hyavary; Cudajas; Rio Gonçallo; Montalegre; Rio Reto; Rio Puty; Manacapuru; Tonantins; Lago Alexo; Cameta.

This variety could again be divided; the most western specimens are more uniform in color; the color markings becoming more distinct eastward as far as Santarem where the color is in well-defined areas as described. In some examples the profile is straight and in others the head is depressed, with a marked angle at the base of the occipital crest.

In some specimens the body is much shortened and deepened, and the lateral bands are broken up into spots, making exact counterparts of the plate of *macrospila*=*arekaima.*

124c. A single specimen in bad condition differs from the descriptions given above.

No. 7461; .16 m. Rio San Francisco.

Snout pointed; eye large. 3⅖ in head, 1½ in snout; maxillary barbels extending beyond anal; humeral process straight below, curved above, ending in a sharp point. Dorsal spine 1⅓ in head; pectoral spine as high as the dorsal spine, smooth in front, sharp recurved hooks its whole length behind. Internasal distance 3 in eye.

124d. Maxillary barbel to end of adipose; mentals not beyond middle of pectoral; postmental to base of ventral. Eye 2 in snout, 4⅓ in head, 1⅔ in interorbital.

Mouth at the angle 3 in length of head.

Upper jaw projecting beyond the lower, depth of the intermaxillary band of teeth not wider than the maxillary band; internasal space 2 in the eye.

Opercle as wide as eye. Humeral process very angular rhomboidal, wider than in II.

Adipose dorsal $1\frac{3}{5}$ in head. Dorsal spine 1 in head; pectoral spine $1\frac{1}{5}$ in head; ventral fin $1\frac{2}{5}$ in head.

Plain dusky, all the fins dusky; a dark spot at base of dorsal spine; sometimes with a light streak along the lateral line.

The specimens in the museum are from Avary, Para; Iça; San Gonçallo; Jutahy; Rio Puty.

The longest specimen measures .25 m.

124e. Dorsal spine longer than head; humeral process triangular.

Maxillary barbel extending beyond base of caudal; mental beyond base of ventral; postmental to near tip of pectoral. Eye 2 in snout, $3–4\frac{1}{2}$ in head. Distance between anterior and posterior nares 2 in eye. Width of intermaxillary band of teeth about 6 in its length. Opercle about equal to the length of the eye. Caudal lobes pointed, $\frac{1}{3}$ longer than head. Adipose dorsal about 5 in the length. Dorsal spine $\frac{1}{3}$ longer than head; pectoral spine about as long as the head. Ventral fins little shorter than head.

Color brownish, white below.

This variety representing the *macronema* of Bleeker is represented by several specimens from the Amazon.

From the descriptions here given it will be seen that not all the varieties so far described are represented; also that some not yet described are in the collection. We have not thought it best to name the old or the new varieties. In order to settle the boundaries of each variety, one should have an unlimited supply of specimens of all the varieties; until such a collection is made it is useless to name them as there would assuredly be a shifting of names, and the confusion is already great enough.

125. Pimelodus grosskopfii.

Pimelodus grosskopfii Steindachner, SB. Ak. Wien, lxxx, 1879, Ichthyol. Beiträge, viii, 68 (Cauca); Steindachner, Fisch-Fauna des Cauca & Flüsse bei Guayaquil, 5, pl. i, fig. 1-1a, 1879 (Cauca).

Habitat: Magdalen river and its tributaries.

We have not seen any specimens of this species; it seems to agree very closely with some forms of *clarias*.

126. Pimelodus labrosus.

Pimelodus labrosus (Kröyer MS.) Lütken, Vidensk. Meded. 1874, 200 (La Plata).

Habitat: La Plata.

This may be a valid species. Dr. Lütken even places it in a group distinct from *maculatus*, but as he has not made the differences evident to one who has not both species or varieties we have placed it here.

Only the types are known.

127. Pimelodus valenciennis.

Pimelodus valenciennis (Kröyer MS.) Lütken, Vidensk, Meded. 1874, 200 (La Plata).

? *Pimelodus nigribarbis* Boulenger, Ann. & Mag. Nat. Hist. Oct. 1889, 266 (Camapuam River).

Habitat: Rio Plata.

This species is distinguished chiefly by the length of its anal and adipose fins. It is known only from the types.

128. Pimelodus westermanni.

Pimelodus westermanni (Reinhardt MS.) Lütken, Dan. Viden. Selsk. 1874, 32 (Rio das Valhas); Dan. Selsk. Skr. 167, plates ii and iii, fig. 4, 1875 (Rio das Velhas).

Habitat: Rio das Velhas.

This species is distinguished chiefly by the absence of an intermaxillary band of teeth. Only the types are known.

129. Pimelodus altipinnis.

Pimelodus altipinnis Steindachner, SB. Ak. Wien, lix, 1864, Ichthyol. Notiz. i, 14, plate ii, figs. 3 and 4 (Demarara); id. lxxiv, 1876, Ichthyol. Beitr. iv, 56, plate xi (Para; Santarem; Cameta); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 135, 1888 (Para).

Habitat: Amazon and northward.

The numerous specimens in the museum are from Para.

Body deeper than wide, compressed towards the caudal; head flat below, regularly convex in a cross-section above; profile straight or making a decided angle at the base of the occipital crest; width of the head about 1⅖ in its length, its width at the angle of the mouth 3; its depth 1⅘; entire upper portion of head granulate or striate; fontanel wedge-shaped, its broad base opposite the posterior margin of the eye. Occipital crest narrow; its width at the base 2 in its length; its tip truncate.

Distance between the anterior and posterior nares equal to the diameter of the eye.

Maxillary barbel reaching far beyond tips of caudal; mental barbels to middle of pectoral, postmentals beyond tip of ventral.

Eye very small, 5½–6 in head, 2½–3 in snout, 1½ in interorbital, 2 diameters behind angle of mouth.

Mouth narrow, distinctly inferior, the upper jaw projecting beyond the lower for at least half the diameter of the eye; depth of mandibulary band of teeth 2 in eye; intermaxillary band scarcely deeper, its depth 5 to 6 in ts width; numerous minute pores about the snout.

Gill-membranes separated by a deep notch to in front of the eye; gill-rakers 5+10, the first two arches with a single series and a membrane, the third and fourth with two series.

Dorsal spine 1⅕ in head, with sharp, short teeth behind; longest dorsal ray about as long as the head; the spine equidistant from snout and tips of ventrals, measuring in a straight line.

Interspace between the dorsals reduced to a minimum.

Adipose dorsal long and low, 2⅖ in the length.

Caudal very deeply forked, the outer rays about five times as long as the middle rays, twice as long as the head.

Anal emarginate, the last ray longer than the three rays preceding it, the fourth ray longest.

Ventrals equal the head in length; reaching about ⅔ beyond the vent; distance from vent to anal longer than head; the head 2½ in the distance from the vent to the caudal.

Pectoral spine flat and curved, roughened near its middle in front, strongly recurved hooks its entire length behind; its length 1⅕ in head.

Depth of caudal peduncle 2½–3 in head.

Color plain greenish; tips of dorsal dusky.

Head 5; depth 4 to 5½; Br. 7; D. I, 6; A. 11.

130. Pimelodus fur.

Pseudorhamdia fur (Reinhardt MS.) Lütken, Dan. Viden. Selsk. 1874, 33 (Rio das Velhas); Lütken, Dan. Selsk. Skr. 169, plates ii and iii, fig. 3, 1875. (Rio das Velhas).

Pimelodus fur Eigenm. & Eigenm., Proc. Cal. Acad. 2d Ser. i, 135, 1888 (Rio das Velhas; Giquitiba; Rio San Francisco).

Pimelodus maculatus Kner, SB. Ak. Wien, xxvi, 413 (Irisanga; Rio Branco; Barra do Rio Negro); in part.

Pimelodus microstoma Steindachner SB. Ak. Wien. lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 44, foot note (Irisanga; Rio Branco; Barra do Rio Negro).

Habitat: Amazon, Rio San Francisco and its tributaries.

We are unable to distingush *Pimelodus microstoma* from the specimens of *P. fur* in the Museum. The specimens examined are soft and their depth is not as given by Lütken and Steindachner. They are from the Rio das Velhas and Giquitiba on the Rio San Francisco.

Body slender, compressed towards the caudal; head conical, scarcely wider than the body; its width 1⅗ in its length; its depth, at the posterior margin of the eye, 2 in its length; profile regularly curved from the dorsal spine to the snout; head convex in tranverse section. Occipital crest triangular, longer than wide, entirely covered with thin skin; fontanel not extending to opposite posterior margin of eye; a small groove or pit at the base of the occipital crest; distance between anterior and posterior nares equals ⅗ the diameter of the eye.

Maxillary barbel extending to the base of the caudal or posterior margin of anal; mental barbels to base of pectoral; postmental to near tip of pectoral.

Eye 1⅓ to 1⅘ in snout, 3⅓ to 4 in head, ⅗ in interorbital.

Mouth narrow, 3 in head, bordered by a broad lip; depth of intermaxillary band of teeth about 3 in its width, the outer row of teeth longer than the others.

Gill-openings separate to a little in front of eye; gill-rakers 4+12.

Humeral process as wide as in *clarias*.

Dorsal spine nearer snout than anal fin, measuring in a straight line; rather strong teeth behind, 1⅓ in head.

Adipose dorsal high and thin; its distance from the dorsal longer than the base of the dorsal, about 4½ in the length. Caudal deeply forked, upper lobe slightly longer, longer than head.

Anal concave, the third ray longest, 1½ in head.

Ventrals 1⅓ in head. Distance between the vent and anal one-half a diameter of the eye shorter than head.

Pectoral spine roughened in front, close-set recurved hooks its whole length behind; 1⅕ in head.

Upper half of body greenish-gray (olivaceous), below the lateral line white; a dusky area behind the humeral arch; upper anterior portion of body and sometimes top of head with numerous small round dark spots.

Dorsal fin dusky on its free half, and a series of dark spots at its base. Other fins plain.

Head 4½; depth 6½; D. I, 6; A. 12.

XXII. Gen. Nov. ?

131. ? agassizii.

Pirinampus agassizii Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 57, pl. 12 (Para); Vaillant, Bull. Soc. Philom. series 7, iv, 153, 1880 (Calderon).

Habitat: Amazons.

This species seems to differ decidedly from other genera. We have not been able to examine any specimens, and leave its generic identification to some one who can examine specimens.

Head, behind the eyes, granulated; first dorsal ray spinous and much shorter than the next ray. Fontanel not extending behind the eyes. Occipital process not reaching the dorsal plate; barbels compressed, ribbonlike.

Profile straight to the base of the occipital crest, somewhat steeper behind; transverse section of the head convex; width of head 1⅔ in its length. Upper jaw projecting for about ½ the width of the intermaxillary band of teeth. Occipital process narrow, not reaching to the dorsal plate. Frontal fontanel widest behind, ending abruptly above the posterior margin of the eye. A small occipital fontanel (in specimens .195 m.) Mental barbels long, band-like. Maxillary and postmental barbels reaching to end of anal; mentals to near tip of ventral fin. Pectoral and dorsal spines slender, their inner and outer margins with fine teeth. Highest dorsal ray little less than the head in length. Pectoral spine little less than the head in length, reaching to near the shorter ventrals. Adipose fin 2⅓ in the length. Upper caudal lobe longer.

Chocolate brown, with numerous round, dark violet spots everywhere except on belly. Head 3; depth 5½; D. I, 6; A. 12. (Steindachner).

XXIII. CONORHYNCHOS.

Conostome Dumeril, "Ichthyol. Anal. 484." 1856.

Conorhynchos Bleeker, Ichth. Arch. Ind. Siluri, 205 and 209, 1858 *(conirostris)*.

Conorhynchus Bleeker, Nederl. Tijdschr. Dierkunde, i, 102, 1863 (*conirostris*).

Adipose fin higher than long; occipital process continued to the dorsal plate. Fontanel not continued behind the eye. Dentition very weak, disappearing with age. Snout produced. Anal rays 18 to 20.

ANALYSIS OF THE SPECIES OF CONORHYNCHOS.

a. Entire postorbital portion of the head granular. No teeth in the lower jaw, all the teeth disappearing with age. (CONORHYNCHOS.)
  b. Barbels thin, shorter than the head. Dorsal spine longer than the pectoral spine, 1½ in head. Caudal and anal fins emarginate. Width of head 2 in its length. D. I, 6–7; A. 18–20. *conirostris* 132.
aa. Postorbital portion of the head smooth, covered with skin; teeth in the lower jaw and on the vomer. (subg. ?) *glaber* 133.

132. Conorhynchos conirostris.

Pimelodus conirostris Cuv. & Val. Hist. Nat. Poiss. xv, 204, plate 436, 1840 (Rio San Francisco).

Conostome conirostris Dumeril, "Ichthyol. Anal. 484."

Conorhynchus conirostris Bleeker, Nederl. Tijdschr. Dierk. i, 1863, 102 (name only); Günther, Cat. Fish. Brit. Mus. v, 135, 1864 (Rio Cipo, tributary of Rio das Velhas); Lütken, Vidensk. Selsk. Skr, 162, 1875 (Rio das Velhas).

Habitat: Rio San Francisco and its tributaries.

133. Conorhynchos glaber.

Conorhynchus glaber Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 79, plate viii (Porto Seguro).

Habitat: Porto Seguro.

XXIV. BAGROPSIS.

Bagropsis Lütken, Dan. Viden. Selsk. Skr. 1874, 32 (*reinhardti*).

Type: *Bagropsis reinhardti* Lütk.

This genus is very closely related to *Pimelodus*. The top of the head is striate, entirely covered with skin. There are two moderately large patches of teeth on the vomer and larger patches on the posterior part of the palate. We have not been able to examine the single species.

134. Bagropsis reinhardti.

Bagropsis reinhardti Lütken, Viden. Selsk. Skr. 1874, 32 (Rio das Velhas); id. l. c. 1875, 160, plate i, fig. 2 (Rio das Velhas).

Habitat: Rio das Velhas.

This species is known only from the types.

Head broad and depressed; eyes little nearer edge of opercle than tip of snout, 7 in head, 2 in interorbital. Fontanel between the eyes. Upper jaw projecting for half a diameter of the eye. Maxillary barbels reach to the anal. Dorsal spine serrate on its inner margin near the tip, more than half as long as the head. Distance of the adipose fin from the dorsal fin equals the base of the dorsal or longer. Adipose fin 5 in the length. Pectoral spine moderately broad, curved, with strong teeth on its posterior margin. Greenish with golden reflections, lower parts white; top of head and sides with dark spots. Head 3¾; depth 5⅓; Br. 10; D. I, 6; A. 11 (Lütken).

XXV. PIRAMUTANA.

Piramutana Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 99 (*piramuta*).

Type: *Bagrus piramuta* Kner.

Top of head and occipital process granulated, covered with skin. Occipital process not quite reaching the dorsal plate.

Teeth cardiform; those on the vomer and palatines forming an uninterrupted band. Maxillary barbels flattened, band-like.

135. Piramutana piramuta.

Bagrus piramuta Kner, SB. Ak. Wien, xxvi, 1857, 382 (Barra do Rio Negro; Borba, Rio Madeira).

Piramutana piramuta Bleeker, l. c. (name only); Gunther, Cat. Fish. Brit. Mus. v, 111, 1864 (copied); Steindachner, Flussfische Südamerika's iii, 2, plate iv, 1882 (Para).

Habitat: Amazon and its tributaries.

First dorsal ray prolonged; adipose fin half its length in front of the anal; anal emarginate. Maxillary barbel reaching past base of ventrals.

Head $3\frac{4}{5}$; D. I, 6; A. 14. (Steindachner.)

XXVI. PLATYNEMATICHTHYS.

Platynematichthys Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 99 *(punctulatus)*.

Type: *Bagrus punctulatus* Kner.

Both jaws with very broad bands of teeth; vomer with a broad band of teeth; palatines edentulous. Barbels broad, band-like; occipital process reaching to the dorsal plate. Surface of the bones of the skull furrowed and granulate but covered with skin.

136. Platynematichthys punctulatus.

Bagrus punctulatus Kner, SB. Ak. Wien, xxvi, 1857, 380 (Forte do Principe, Rio Guaporé; Rio Branco).

Platynematichthys punctulatus Bleeker, l. c. (name only); Günther Cat. Fish. Brit. Mus. v. 112, 1864 (copied).

Bagrus nigripunctatus Kner, Wiegm. Arch. 1858, 345.

Habitat: Amazon; Solimoens and their tributaries.

Rictus under the anterior edge of the orbit. Jaws equal. Vomerine band of teeth widest at the outer edges, little more than half as wide as the intermaxillary band. Eye nearer snout than free edge of opercle, 4–4½ in interorbital. Maxillary barbels extend to the middle of the opercle. Dorsal and anal emarginate. Base of the adipose fin shorter than the anal. Pectoral spine with fine teeth on its outer edge, with strong teeth on its inner edge near the tip; it reaches the vertical from the end of the dorsal fin. Sides and back brown with black spots, lower parts white. Fins immaculate.

Head 5 in the total; Br. 8–9; D. I, 6; A. 16 (Kner).

137. Platynematichthys ? araguayensis.

Galeichthys araguayensis Castelnau, Anim. Am. Sud Poiss. 37, plate 17, fig. 3, 1855 (Araguay River).

Platynematichthys araguayensis Eigenm & Eigenm, Proc. Cal. Acad. 2d Ser. i, 135, 1888 (name).

Maxillary barbels reaching to the tip of the pectorals; adipose fin four times as long as the anal, 3 in the total length, caudal fin slightly emarginate; D. I, 7; A. 9.

This species is known only from Castelnau's description and figure.

XXVII. PHRACTOCEPHALUS.

Phractocephalus Agassiz, Gen. et Spec. Pisc. Bras. 22, 1829 (*bicolor* = *hemiliopterus*).

Type: *Silurus hemiliopterus* Bloch & Schneider.

Body rather short, head very broad in proportion; Upper portion of head with vermiculating elevations. Occipital process broad, rounded behind, not quite reaching to the broad reniform dorsal plate. Upper half of adipose fin usually rayed.

138. Phractocephalus hemiliopterus.

Silurus hemiliopterus Bloch & Schneider, "Syst. Ichthyol. 385, 1801."

Phractocephalus hemiliopterus Cuv. & Val. Hist Nat. Poiss. xv, 3, plate 421, 1840; Schomburgk, Fishes of Guiana, part i, 169, 1841 (Guiana everywhere); Müller & Troschel, Schomburgk, Brit. Guiana, 643, 1849 (all rivers of Guiana); Castleuau, Anim. Amérique du Sud, 47, plate xv, fig. 4, 1855 (Rios Crixas, Araguay, Amazon); Günther, Cat. Fish. Brit. Mus. v, 110, 1864 (River Cupai); Vaillant, Bull. Soc. Philom. series 7, iv, 152, 1880 (Calderon); Cope, Proc. Am. Philos. Soc. 17, 1878 674, (Peruvian Amazons); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 135, 1888 (Xingu; Coary; Teffé; Manacapuru; Obidos; Lake Hyanuary).

Phractocephalus bicolor Agassiz, Gen. Spec. Pisc. Bras. 23, 1829 (Amazon).

Pirarara bicolor Spix, Gen. Spec. Pisc. Bras. 23, plate vi, 1829 (Amazon).

Habitat: Amazon, Solimoens, Maranon, their tributaries and northward.

This species attains a size of over 1.20 m.

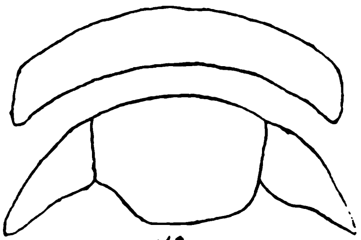
The specimens examined vary in length from .07–1.00 m.; Xingu; Coary; Teffé; Manacapuru; Obidos; Lake Hyanuary; Villa Bella; Rio Negro.

Body rapidly tapering towards caudal; head heavy, broad, flattened between the eyes; greatest width of the head equals its length; width at the angle of the mouth 2 in its length.

Eye 9 in head, 3 in snout; 5 in interorbital; 2 diameters behind the rictus.

Maxillary barbel on edge of lip, opposite anterior nostril, reaching beyond the tips of the pectoral fin; mental barbels $\frac{2}{3}$–$\frac{1}{2}$ as long as postmental barbels, which reach the pectoral.

Lower jaw included; teeth all alike; those on the intermaxillaries in a broad band of equal depth throughout; vomerine teeth in a much broader patch; palatine teeth in narrower wedge-shaped patches contiguous to the vomerine patch.



42.

Gill-membranes separate to below anterior margin of the eye. Gill-rakers short and fleshy, 4+15.

Bones behind eye variously grooved and granulated; the occipital process broadly rounded behind, not meeting the reniform dorsal plate.

Dorsal spine midway between snout and tip of adipose dorsal, and between bases of pectoral and ventral fins; last dorsal ray over base of ventral, the length of the spine 2¼ in head.

Adipose dorsal short, high, its upper portion generally transformed into true rays; its base longer than that of the anal.

Caudal broad, slightly emarginate. The rays of the dorsal and caudal thick and terete, once or twice branched. Ventrals extending for half their length beyond the vent.

Pectoral spine two or three times as thick as the dorsal spine, broad lamellæ in front and sharp recurved teeth behind; its length 2 in head.

Color: between pectorals and anal dark brown; lower part of head, a narrow band above pectorals and along sides spreading over the lower ¾ of the tail white (yellow in life), region about this brownish; a round white spot on each side of dorsal spine; orbit bordered with white above, head and ante-dorsal region with darker spots or vermiculations; sometimes all of lower parts are white.

Head 3⅓; depth 4¾; Br. 9; D. I, 7; A. 9.

XXVIII. SCIADES.

Sciades Müller and Troschel, Horæ Ichthyol. iii, 8, 1849 (sp.)

Sciades Bleeker, Ichthyol. Arch. Ind. Siluri. 62 and 66, 1858 (*pictus*).

Leiarius Bleeker, Nederl. Tijdschr. Dierkunde i, 99, 1863 (*longibarbis* = *pictus*).

Sciadeichthys Bleeker, Nederl. Tijdschr. Dierkunde i, 99, 1863 (*pictus*).

Sciadeoides Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 136 (*marmoratus*).

Type: *Bagrus pictus* M. & Tr.

Müller & Troschel do not indicate a type for their subgenus *Sciades*. Dr. Bleeker in 1858 restricted it to *pictus* but afterwards to *emphysetus*, the first species mentioned by Müller & Troschel.

The genus is chiefly marked by the number of dorsal rays, 10 or 11, and by the small patches of palatine teeth which are widely separated from the vomerine patches.

ANALYSIS OF THE SPECIES OF SCIADES.

a. **Occipital process large, triangular, meeting the dorsal plate. Entire postorbital portion of the head granulated. Width of the head 1⅛ in its length. (SCIADES.)**

b. Eye large, 6 in head; maxillary barbels extending beyond dorsal, beyond caudal in young. Vomerine teeth in two patches which become united in the adult. *pictus* 139.

aa. Surface of the head and occipital process entirely covered with thick skin, outline of occipital process entirely hidden under the skin; head little longer than broad. (SCIADEOIDES.)

c. Eye 10 in head; maxillary barbels extending to the end of the adipose fin. Vomerine teeth always in two patches. *marmoratus* 140.

139. Sciades pictus.

Bagrus (Sciades) pictus Müller & Troschel, Horæ Ichthyol. iii, 8, 1849; Kner, SB. Ak. Wien, xxvi. 386.

Sciades pictus Günther, Cat. Fish. Brit. Mus. v, 113, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 136, 1888 (Rio Negro; Villa Bella).

Arius (?) longibarbis Castlenau, Anim. Nouv. Rares de l'Amerique du Sud, 36, plate xv, fig. 2, 1855 (Amazon).

Sciades longibarbis Günther, Cat. Fish. Brit. Mus. v, 114, 1864 (copied).

Habitat: Amazon and its tributaries.

The description and figure of *pictus* agree with a specimen .28 m. long in all characters except the vomerine teeth, which are in two separate patches. Müller & Troschel doubtless overlooked the narrow interspace between the vomerine patches, as Castelnau overlooked the palatine teeth. There can be no doubt but that *pictus* M. & T. and *longibarbis* Castelnau are identical.

A specimen .28 m. long was collected by Prof. Agassiz at Villa Bella, another .60 m. long was collected by Mr. Dexter in the Rio Negro.

Head narrow angular, flattish above, its width at the rictus 1⅔ in greatest width, which is equal to 1⅓ in length of head; Fontanel not continued behind the frontals. Body rather deep at the dorsal fin.

Eye 2¼–2¾ in snout, 5–6 in head, 2–2¼ in interorbital.

Maxillary barbels extending beyond tips of caudal in specimens .28 m. long, little beyond dorsal in specimens .60 m. long; mental barbels to base of pectorals or beyond; postmentals beyond base of ventrals (.28) or to middle of pectoral (.60 m.)

Upper jaw slightly the longer. Teeth all firmly set, those of the jaws in bands of equal depth. Vomerine teeth in two patches which become united in the old; palatine teeth remote, in two longitudinally ovate patches.

Gill-rakers overlapping, 4+15.

Dorsal spine very variable, longer than head in young, ⅓ shorter than head in adult. Base of adipose dorsal equals length of head. Caudal deeply forked, the lobes about equal to the head in length. Pectoral spine roughened on its anterior margin, strong hooks on its posterior margin, its length 1¼–1⅕ in head.

Dorsal fin with large round dusky spots; barbels annulated with light and dark.

Head 4; depth 5–5½; D. I, 9 to 10; A. 11.

140. Sciades marmoratus.

Sciades marmoratus Gill, Proc. Acad. Nat. Sci. Philad. 1870, 95 (Upper Amazons). Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. i, 136, 1888 (Tabatinga).

Habitat: Marañon.

The specimens examined by us are from Tabatinga; they measure .50 and .58 m.

The teeth on the vomer are longitudinally ovate and not as in Dr. Gill's specimen "transversely ovate."

The vomerine teeth are in two patches, even in the largest specimen.

Width of head at angle of mouth 1½ in greatest width, 1¾ in length of head; eyes pointing upward and outwards; no dermal ossification in adult. Body subterete, heaviest under first dorsal spine. Head flattish, depressed.

Eye small, 4¼ in snout, 10 in head, 5 in interorbital, 1½ diameters behind the rictus.

Maxillary barbels extending to end of adipose fin; mentals to base of pectoral; postmentals to tips of pectorals.

Teeth as in the young of *longibarbis*; the palatine patches one-fourth as large as the vomerine patches, longitudinally ovate.

Gill-rakers overlapping at the angle, 4+10.

Dorsal spine inserted above the middle between bases of pectoral and ventral; its distance from snout equal to its distance from the adipose dorsal; its length 1⅕ in length of head; base of adipose equals the head in length.

Caudal forked, the outer rays more than twice as long as the middle rays, 1⅓ in length of head.

Ventrals extending one-third their length beyond the vent.

Pectoral spine 1⅕ in head, not roughened in front, fine teeth on its posterior margin; a minute pectoral pore.

Color grayish with dark spots; all fins dark with indistinct markings; barbels annulated with lighter and darker.

Head 4; depth 5½; Br. 9 or 10; D. I, 10 or 11; A. 12.

XXIX. NEMUROGLANIS.

E. & E. Proc. Cal. Acad. Sci. 2d Ser. vol. ii, 1889, 29 (*lanceolatus*).

Type: *Nemuroglanis lanceolatus* E. & E.

This genus belongs with those *Pimelodina* Günther having teeth on the vomer. The character of its caudal is sufficient to distinguish it.

Caudal long lanceolate; adipose fin long and low, joined to the caudal. Head without any evident occipital process. No bucklers in front of the dorsal which is placed over the ventrals.

141. Nemuroglanis lanceolatus.

Nemuroglanis lanceolatus E. & E. Proc. Cal. Acad. 2d Ser. ii, 29, 1889 (Jutahy).

Type: No. 8169; one specimen .035 m. Jutahy. Thayer Expedition.

Elongate slender, tail compressed, head and body depressed. Head narrowed forward, its greatest width 1⅖ in its length; its width at the angle of the mouth about 2 in its length. Surface of the head covered with thin skin.

Eye 2–2½ in the snout which is equal to the interoribital.

Maxillary barbel reaching beyond origin of dorsal; mental and postmental beyond base of pectoral.

Distance of origin of dorsal from tip of snout 2¾ in the length. Dorsal without a basal plate or a spine.

Distance of adipose from dorsal somewhat greater than the length of the dorsal. Adipose fin low, joined to the caudal. Caudal rays rapidly tapering to the middle ones, which are gratly prolonged, less than 2½ in the length.

Anal rays all of about the same height.

Ventrals long and narrow, inserted under the anterior half of the dorsal and reaching half way to middle of anal. Pectoral long lanceolate, without a spine.

Uniform yellow.

Head 4½; D. 7; A. 13.

XXX. BRACHYPLATYSTOMA.

Platystoma Cuv. & Val. Hist. Nat. Poiss. xv, 1840, sp.

Brachyplatystoma Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 97 (*vaillanti*).

Piratinga Bleeker, l. c. 99 (*reticulata*).

Malacobagrus Bleeker, l. c. 100 (*filamentosus*).

Type: *Platystoma vaillanti* Cuv. & Val.

This genus differs from all other *Pimelodinæ* in the peculiarity of its dentition. The inner teeth of the intermaxillaries are long, slender and depressible; the outer ones are shorter, stronger and recurved. The teeth on the vomer and palatines are smaller than those on the intermaxillaries. Caudal deeply forked. Branchiostegals 11 or 12. Fontanel elongate elliptical.

Habitat: Rio Parahyba to Guiana; Amazon to Calderon.

The group of long and spatulate Pimelodinæ of Günther can scracely be retained, because perfect intergradations exist, and because some of the short-snouted genera *Piratinga*, *Piramutana* have really longer snouts than *Steindachneria*, *Duopalatinus*, and *Brachyplatystoma*.

ANALYSIS OF THE SPECIES OF BRACHYPLATYSTOMA.*

a. Maxillary barbels reaching past base of ventrals.
  b. Skin not entirely reticulate; occipital process long, reaching to the dorsal plate or slighty shorter. *vaillanti* 143.
  bb. Skin everywhere reticulate; occipital process not reaching to the dorsal plate; longest caudal ray almost as long as the head. Head 4; Br. 12; D. I, 6; A. 12. (Kner.) *reticulatum* 144.
aa. Maxillary barbels not extending to the ventrals. *rousseauxii* 145.

142. Brachyplatystoma filamentosum = *vaillanti?*

Pimelodes filamentosus Lichtenstein, Wiedem. Zool. Mag. i, part 3, 60 (Brazil).

Malacobagrus filamentosus Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 100 (name only).

Piratinga filamentosa Günther, Cat. Fish. Brit. Mus. v, 112, 1864 (copied).

Brachyplatystoma filamentosum Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 136 (name).

Habitat: Brazil.

This species is a true *Brachyplatystoma* with the teeth as described for this genus. It cannot be separated on account of the number of branchiostegal rays because Lichtenstein states that they cannot be counted, and he estimates them at 7.

Br. 7; D. 7; A. 9. Upper caudal lobe produced; length to end of lower caudal lobe 9 inches, to end of upper caudal lobe 22 inches.

Maxillary barbels 24 inches. Spine soft. Head flattened forward, pointed. Occipital process scarcely noticeable, 1 inch from the dorsal spine. Adipose fin as long as and opposite to the anal. Upper jaw longer,

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*142. *Brachyplatystoma filamentosum* is left out of this key.

vomerine teeth and the inner ones of the jaws velvety. Eyes about in the middle of the head; interocular 1 inch. (Lichtenstein.)

143. Brachyplatystoma vaillanti.

Platystoma vaillanti Cuv. & Val. Hist. Nat. Poiss. xv, 21, plate 423, 1840 (Cayenne & Surinam); Kner, SB. Ak. Wien, xxvi, 1857, 397 (Para); Günther, Cat. Fish. Brit. Mus. v, 108, 1864 (Demarara); Peters, MB. Ak. Berl. 469, 1877 (Calabozo).

Brachyplatystoma vaillanti Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 97 (name only); id. Silures de Suriname 70, 1864 (Surinam); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 136 (Tabatinga; Para; Porto do Moz; Avary; Rio Puty; Juiz de Fora).

Platystoma affine Cuv. & Val. Hist. Nat. Poiss. xv, 1840 (Brazil); Castlenau, Anim. Am. Sud. Poiss. 40, 1855 (Araguay); Günther, Cat. Fish. Brit. Mus. v, 109, 1864 (copied).

Platystoma mucosa Vaillant, Bull. Soc. Philom. Ser. 7, iv, 151, 1880 (Calderon).

Platystoma verrucosum Boulenger, Zool. Record, xix, Pisces, 1880 (name only); a substitute for *mucosa* Vaillant.

Habitat: Eastern slopes of South America, north of the Rio Parahyba.

Cuvier and Valenciennes based their description of *vaillanti* on specimens from .15 to .38 m. long, and their *affine* on a specimen .60–.65 m. long without the caudal. In *affine* the occipital process does not reach the dorsal armature.

We have examined specimens from .20 to over .80 m. in length and find that in the young the entire upper surface of the head has the skin ossified and the occipital process reaching the dorsal armature. In the larger specimens the head is entirely covered with skin and the occipital process is as described in *affine*; we have, therefore, placed it in the synonymy of *vaillanti*.

Platystoma mucosa is insufficiently described. It is probably identical with *vaillanti*.

Body rather short and deep, its width below first dorsal spine not equal to its depth. Profile steep, width of head at the rictus 2 in its length. Occipital process reaching dorsal plate.

Maxillary barbel past ventral (past tip of caudal in young); mental barbels half way to pectoral (past ventral in young); postmentals to base of pectoral (to base of caudal in young).

Eye 8–18 in head, 4–8½ in snout, 2½–5½ in interorbital, 1⅖–2½ diameters behind the rictus.

Teeth of the upper jaw in a broad band, the outer ones similar to those in the lower jaw, the inner ones long, slender, depressed and freely movable; those of the vomer much smaller, the teeth on the palatines still smaller.

Gill-membranes separate to below the angle of the mouth; gill rakers fine, scarcely shorter than the eye, 6–9+15–24.

Skin on sides of head and on snout reticulate, the reticulations sometimes continued on nape and along anterior portion of the lateral line.

Dorsal spine equidistant from tip of snout and middle of adipose, serrated behind, and near its tip in front in young, 1½ in head. Adipose fin longer than the anal.

Caudal fin very deeply lobed, the lobes filiform, the upper in the young equal to half the length of the body or longer, the rays normal. Ventrals one-half their length beyond the vent (one-fourth in adult), 1⅗–3 in head. The distance from the vent to the anal equals 4 diameters of the eye (11 in the adult); from the vent to the caudal two-fifths more than length of head.

Pectoral spine 1⅘–2 in head.

Uniform brownish.

Head 3¼–3¾; depth 5½; Br. 11 or 12; D. I, 6; A. 13.

The specimens examined are from Tabatinga; Para; Porto do Moz; Avary; Rio Puty; Juiz de Fora, on the Parahyba; Serpa; Rio Negro. The largest 1.19 m.

144. Brachyplatystoma reticulatum.

Bagrus reticulata Kner, SB. Ak. Wien, xxvi, 1857, 376 (Salto Theotonio, on the Araguay; Forte do Rio Branco; Rio Madeira).

Piratinga reticulata Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 99 (name only); Günther, Cat. Fish. Brit. Mus. v, 113, 1864 (copied).

Brachyplatystoma reticulatum Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 136 (name).

Habitat: Rio Tocantins, Amazon and its tributaries; Rio Madeira.

This species is known only from the types; it is closely related to, if not identical with, *vaillanti*.

145. Brachyplatystoma rousseauxii.

Bagrus rousseauxii Castelnau, Anim. Nouv. Rares de l'Am. du Sud, 32, plate 14, fig. 1, 1855 (Amazon).

Brachyplatystoma rousseauxii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 1888, 136 (Para).

Bagrus goliath (Heckel MS.) Kner, SB. Ak. Wien, xxvi, 1857, 379 (Salto Theotonio).

Piratinga goliath Günther, Cat. Fish. Brit. Mus. v, 113, 1864 (copied); Steindachner, Flussfische Südamerika's, iii, 1, plate 3, 1882 (Para).

Habitat: Amazon and its tributaries.

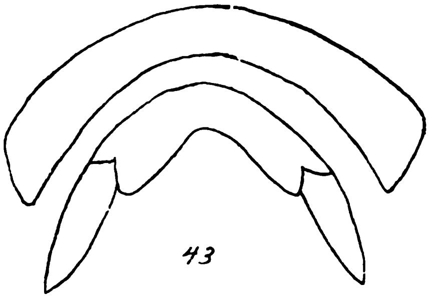
We are unable to distinguish *rousseauxii* from *goliath*.

Width below the dorsal spine about equal to or greater than the depth. Snout very much produced, spatulate. Width at angle of mouth 2 in head; greatest width of head $1\frac{3}{5}$ in its length. Head entirely covered with skin which is very porous and more or less reticulated. The occipital crest triangular, concealed under the thick skin, not reaching the dorsal plate, one-third of the distance to the dorsal spine. Fontanel long, elliptical, its central point over the eye.

Eye small, elongate, $7\frac{1}{2}$ in snout, 15–18 in head, 4–$4\frac{1}{2}$ in interorbital; snout about 2 in head.

Maxillary barbels reaching little beyond base of pectoral; mental barbels very short, scarcely reaching beyond the vertical from the posterior margin of the orbit; postmentals about to middle of pectoral.

Jaws equal, or the upper a little longer, the teeth of the outer two or three series of the intermaxillary band short, stout and recurved, the teeth of the inner slender, straight and freely depressible; teeth on the anterior half of the vomer cardiform, those of the inner half and those of the palate much smaller, villiform; teeth of the lower jaw similar to those of the intermaxillary, but the difference not so marked between the anterior and posterior portions of the band.



Gill-rakers wide set, little overlapping, the longest scarcely shorter than the long diameter of the eye, 5+11.

Dorsal spine inserted slightly nearer base of ventral than to base of pectoral, its distance from snout equalling that to the end of the first third of the adipose fin. Dorsal spine without teeth produced in a filament, its length, including filament, 1½ in head, first ray scarcely shorter, the fin emarginate.

Adipose fin about as long as the anal.

Caudal fin very deeply forked, the lobes long and pointed, the upper ending in a long filament in one example; the lobe, including filament, which seems to have been broken off, being more than half the length of the body.

Ventrals reaching about one-fourth their length beyond vent, 1½–1¾ in head. Vent 8 diameters of the eye in advance of the anal.

Pectoral spine roughened in front, recurved teeth on the upper portion behind, its length about 2 in head. A pectoral pore. Humeral process short, covered with skin. The skin of the whole side of the body reticulated and very porous with minute pores.

Color silvery, with a bluish to bronze or copper lustre above.

Head 3¾; depth 5⅘–6; Br. 12 or 13; D. I, 6; A. 15.

Two specimens, from Para.

XXXI. DUOPALATINUS.

Duopalatinus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 136, 1888 (*emarginatus*).

Type: *Platystoma emarginatum* Cuv. & Val.

Teeth all alike, the vomerine patches far removed from the palatine patches.

This genus is closely related to *Brachyplatystoma* from which it differs in the nature and position of the teeth.

146. Duopalatinus emarginatus.

Platystoma emarginatum Cuv. & Val. Hist. Nat. Poiss. xv, 25, 1840 (San Francisco); Lütken, Dan. Selsk. Skr. 1875, 152, fig. (Rio das Velhas).

Duopalatinus emarginatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 1888 (Rio das Velhas; Rio San Francisco below the falls).

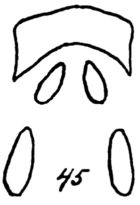
Habitat: Rio San Francisco and its tributaries.

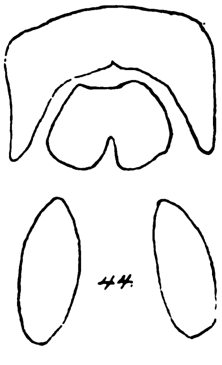
This species being the sole representative of the genus can most readily be distinguished by its teeth.

Head narrow, little depressed; width at angle of mouth 1½ in greatest width, 2½ in its length; its greatest depth 2½ in its length; upper jaw scarcely projecting.

Maxillary barbel reaching to anal; mental barbel extending to base of pectoral, the postmental to tip of pectoral.

Teeth of the upper jaw in a band which is not much narrower at the middle; vomerine teeth, in the young, in two small ovate patches distinct from each other; in much larger united patches in adult; palatine patches ovate, removed from the vomerine patches.





Eye large, 5 in head, 2⅓ in snout, 1⅓ in interorbital, 1⅓ diameters behind the rictus.

Gill-membranes separate almost to angle of mouth; gill-rakers overlapping, 4+11.

Dorsal spine slender, weak recurved teeth behind; equidistant from snout and middle of adipose dorsal and from bases of pectoral and ventral; 1⅘ in head.

Base of adipose about twice length of anal.

Caudal deeply forked, the outer lobes long and pointed, the rays simple or only twice branched.

Ventrals extending one-half their length beyond vent; distance from vent to anal 4 diameters of eye.

Pectoral spine long and slender, roughened anteriorly, with strong teeth posteriorly; 1½ in head, scarcely shorter than the rays.

Head 3¾; depth 6; Br. 11?; D. I, 6; A. 12.

XXXII. ?

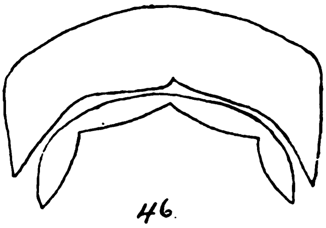
147. ? lutkeni.

Platystoma lütkeni Steindachner, SB. Ak. Wien, lxxiv, 1876, Ichthyol. Beitr. iv, 59, plate 13 (Amazon).

Habitat: Amazon.

This species is known only from the types. Its dentition would prove it distinct from any of the genera enumerated, but as we have not seen any specimens we can not decide about this point.

Palatine and vomerine teeth both present and forming a shallow band immediately behind the wide intermaxillary band; teeth villiform. Upper jaw little projecting. Maxillary barbels to base or tip of ventrals. Adipose fin much longer than the anal. Occipital process reaching the very long dorsal plate. Pectoral spine serrate behind, broader than the dorsal spine.



Chocolate brown, many dark violet spots on back and sides. D. I, 6; A. 12. (Steindachner.)

XXXIII. STEINDACHNERIA.

Steindachneria Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 137, 1888 (*amblyura*).

Type: *Steindachneria amblyura* E. & E.

Palatine teeth none; vomerine teeth in one or two patches. Occipital process reaching or almost reaching the dorsal plate. Spines of the dorsal and pectoral short, prolonged in a fleshy ray. No dermal ossification about the head. Adipose fin longer than the anal. Origin of dorsal equdistant from tip of snout and middle of adipose fin. Branchiostegals 8–10.

The species of this genus, three in number, are confined to southeastern Brazil. While the smaller species of other genera are usually common to several or all of the rivers of southeastern Brazil, these basins seem to be well enough separated to prevent too ready intermingling of the larger species, and there are consequently different species in the different rivers. *Duopalatinus emarginatus*, another of the large species, is found in the Rio San Francisco.

ANALYSIS OF THE SPECIES OF STEINDACHNERIA.

a. Caudal broadly rounded; teeth of the vomer in two patches; maxillary barbel extending to adipose; postmentals beyond base of pectoral; head 1⅗–1¾ in distance from vent to caudal; distance from vent to anal equals 4 orbital diameters. D. I, 6. *amblyura* 148.

aa. Caudal deeply lobed; teeth of the vomer in a single patch; maxillary barbel not extending beyond dorsal; distance of vent from anal 1¼ orbital diameters. D. I, 7–8.

  b. Depth of head 2½–3 in its length; greatest depth 2–2½ in the length of the head; blackish brown with yellow spots and vermiculations. *doceana* 149.

  bb. Depth of head 1⅗–2 in its length; greatest depth 1¼ in length of head. Maxillary barbel not reaching beyond tip of pectoral; postmentals to base of pectoral; head 1⅒ in distance between vent and caudal; brownish, with darker spots. *parahybæ* 150.

148. Steindachneria amblyura.

Platystoma parahybæ Steindachner (in part), Süsswasserf. südöstl. Bras. iii, 82, 1876 (Jequitinhonha).

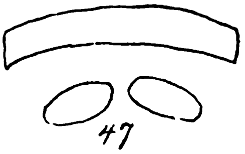
Steindachneria amblyura Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 137, 1888 (Jequitinhonha).

Habitat: Jequitinhonha.

Dr. Steindachner described his *P. parahybæ* from a specimen .56 m. long and refers the other specimens in the Mus. Comp. Zool. from the Jequitinhonha and Parahyba to this species. A comparison of all these specimens shows that those from the Jequitinhonha differ widely from those from the Parahyba, having scarcely anything in common but the color.

We have selected specimens of equal size from the two rivers for comparison.

Body slender. Head much depressed, its width at the angle of the mouth is ⅔ its greatest width which is equal to the length of the head; greatest depth of the head 2⅓ in its length. Eye 8½ in head, 3 in snout, 3½ in interocular; one diameter behind the angle of the mouth.



Gill-rakers 4+9 to 12.

Dorsal spine slender, 2½ to 3 in head, the rays 1¾ to 2. Base of the adipose fin almost twice as long as the base of the anal.

Pectoral spine 2 in head, sharp teeth on its inner margin; outer margin roughened its whole length.

Ventrals extending half their length behind the vent. The membranes of the fins all thin.

Upper parts brownish, with round spots which are smallest on head, sometimes confluent into vermiculations. Adipose fin and caudal with spots; membrane of dorsal fin sometimes with a vertical series of spots, other fins dusky. Lower parts plain.

Head 4; depth 7⅓; Br. 9 or 10; D. I, 6; A. 12.

149. Steindachneria doceana.

Steindachneria doceana E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 30, 1889 (Rio Doce).

Types: Nos. 23,792, 23,793, 23,794; nine specimens; .37-.74 m. Rio Doce.

This species agrees with *St. parahybæ* in the shape of its caudal, the dentition of the vomer, the length of the barbels and the fin rays. It differs greatly in the shape of the head and the color.

Head broad, depressed, the depth at the base of the occipital process 2½–3 in its length; its width 1⅖; greatest depth of body 2–2½ in the length of the head. Occipital process broad, not quite reaching the long, triangular dorsal plate. An elongate frontal fontanel.

Eye median, 3½–5 in the snout, 3–3½ in interocular, 8–11 in the head.

Maxillary barbel reaching to middle of dorsal in smallest to middle of pectoral in largest specimen; mentals to gill opening; postmentals beyond base of pectoral in smallest specimen, shorter in the larger.

Dorsal fin as in *parahybæ*.

Base of adipose ¼–⅕ longer than base of anal.

Pectoral spine stout, strongly serrate on its inner margin in the smallest specimen.

Sides and entire upper surface dark brown with spots and vermiculating markings of light. The unpaired and upper surfaces of the paired fins light, profusely spotted with dark; the spots of the dorsal and pectoral confluent into bars and stripes in the largest specimen, adipose fin colored like the back; ventral surface and lower surface of paired fins plain.

Head 3⅗–3½; depth 6½–7½. Br. 8–9. D. I, 7–8. A. 14.

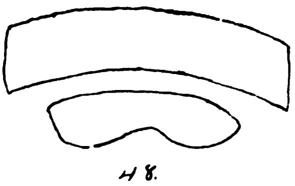
150. Steindachneria parahybæ.

Platystoma parahybæ Steindachner, Süsswasserf. südöstl. Bras. iii, 82, pl. ix (Rio Parahyba near Juiz de Fora), in part.

Steindachneria parahybæ Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 137, 1888 (Rio Parahyba).

Habitat: Rio Parahyba.

Only the types of this species are known.



Body robust. Head not greatly depressed; the profile steep; greatest width of head 1⅖ in its length; greatest depth of head 1⅘–2.

Eye 9–9½ in head, 4 in snout, 2⅔–3½ in interorbital, 2–2½ diameters behind the angle of the mouth.

Gill-rakers 5+12–14.

Dorsal spine 3 in head, the rays 2 in head. Base of adipose fin ½ longer than base of anal. Pectoral spine as long as the dorsal spine.

Ventrals not extending more than ⅕ their length beyond the vent. Membranes of all the fins thick.

Ventral surface plain; upper parts brownish with numerous darker spots, which are smallest on head and on lower parts of the sides. All fins similarly spotted. Rarely uniform reddish brown.

Head 3½; depth 5–6; Br. 8–9; D. I, 7; A. 12–13.

XXXIV. HEMISORUBIM.

Platystoma Cuv. & Val., Hist Nat. Poiss. xv, 27, 1840, (sp.) (preoccupied in Diptera).

Hemisorubim Bleeker, Nederl. Tijdschr. Dierkunde, 1863, 97 *(platyrhynchos)*.

Type: *Platystoma platyrhynchos* Cuv. & Val.

This genus differs from all the others in having the upper jaw thin and truncate; shorter than the lower jaw; snout narrowed, the width at the angle of the mouth 1½ times in the greatest width of the head; mental barbels approximated and placed near the edge of the lip; intermaxillary band of teeth much shallower at the middle than at the ends; the palatine patches are large. The occipital process shorter than the dorsal plate and meeting it. Postorbital portion of the head striated and granulated. Skin on the sides of the head and snout reticulated.

Habitat: Northern Brazil and northward.

151. Hemisorubim platyrhynchos.

Platystoma platyrhynchos Cuv. & Val., Hist. Nat. Poiss. xv, 27, 1840 (no locality); Castelnau, Anim. Nouv. Rares de l'Amér. du Sud, 40, 1865 (Amazon); Kner, SB. Ak. Wien, xxvi, 1857, 398 (Barra do Rio Negro.)

Hemisorubim platyrhynchos Bleeker, Nederl. Tijdschr. Dierk. 1863, 97 (name only); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 138, 1888 (Manacapuru; Rio Negro; Montalegre; Rio Puty; Lago Alexo; Obidos; Coary; Tabatinga; Hyavary; Tonantins; Sao Paolo.)

Hemisorubim platyrhynchus Günther, Cat. Fish. Brit Mus. v, 109, 1864 (copied); Peters, MB. Ak. Berl. 470, 1877 (Calabozo); Cope, Proc. Am. Philos. Soc. xvii, 674, 1878 (Peruvian Amazon); Vaillant, Bull. Soc. Philom. Series 7, iv, 152, 1880 (Calderon).

Habitat: Orinoco, Amazons, Paranahyba and their tributaries.

This species agrees with *Platystomatichthys sturio* in coloration, having large black spots scattered on the sides and a black spot at base of caudal.

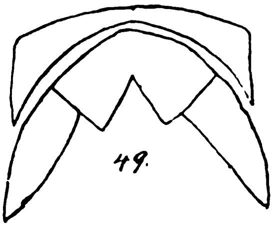
Head depressed, rounded on occiput.

Eye directed upward, 7 in head, 3 in snout, 1¾ in interorbital.

Lower jaw projecting and entering the profile.

Maxillary barbels extending past dorsal; mental barbels approximated, extending to below eyes; postmentals to pectorals.

Teeth in the lower jaw in a narrow band. Vomerine and palatine teeth close behind the maxillary teeth; the vomerine teeth in a single patch separate from the palatine patches.



49.

Dorsal spine weak and slender, 2½ in head; its distance from snout greater than its distance from the posterior margin of the adipose fin; much nearer base of ventrals than base of pectorals; with retrorse teeth behind. Adipose fin longer than anal.

Lower caudal lobe wider and longer than upper, rounded in adult; pointed in young.

Ventrals extending $\frac{2}{5}$ their length beyond the vent.

Pectoral spine $1\frac{3}{5}$ in head, with equally strong teeth in front and behind.

White below; olivaceous above, with a few jet black spots scattered on sides, usually a similar spot at base of upper caudal lobe; fins plain.

Head 3; depth 6–7; D. I, 6; A. 10; Br. 11.

XXXV. PSEUDOPLATYSTOMA.

Platystoma Agassiz, Gen. et Spec. Pisc. Bras. 1829 (sp.)

Sorubim Spix, Gen. et Spec. Pisc. Bras. 1829 (sp.)

Pseudoplaystoma Bleeker, Nederl. Tijdschr. Dierkunde, i, 97, 1863 *(fasciatum)*.

Hemiplatystoma Bleeker, l. c. *(tigrinum)*.

Type: *Silurus fasciatus* Linnæus (in part).

This genus consists of three closely related species and several varieties.

Upper jaw little longer than lower; teeth of the jaws alike; vomerine and palatine patches of teeth more or less united, the two forming a ,-shaped patch on each side of the palate; gill-rakers short, spine-like, not overlapping; caudal deeply lobed, the lobes rounded (except in very young) the rays very much branched, giving the fin a leathery texture. Branchiostegals 14 or 15; barbels short.

Adipose fin shorter than the anal; dorsal spine nearer end of adipose fin than tip of snout.

ANALYSIS OF THE SPECIES OF PSEUDOPLATYSTOMA.

a. **Body usually with vertical bars or lines interspersed with spots; sometimes plain dusky.**

b. Groove of fontanel continued to midway between eye and occipital process; a band of cirri extending to the end of the groove, the tips of the cirri on a level with the surface of the head; a faint transverse groove at base of occipital process.

c. Maxillary barbels extending to or somewhat beyond dorsal fin.

d. Brown above, abruptly white on sides; sides with 10–12 dark cross bars bordered anteriorly by shorter light bars; sometimes dark spots along the lower margin of the sides; dorsal, caudal, tips of ventrals and tips of anal with a few dark spots; head rarely with similar spots. Maxillaries reaching tip of dorsal. *fasciatum* 152.

dd. Black above gradually shading into white below; lateral bars of the abdominal region extending to the edge of the belly; a series of large black spots along the sides; all the fins, the adipose included, conspicuously spotted with dark. Maxillary barbel reaching to origin of dorsal. *fasciatum nigricans* 152a.

cc. Maxillary barbels not reaching to the dorsal.

e. Vertical bars as in *fasciatum*, enlarged at the lower termination, those on the abdominal portion of the body broken up into spots; a lateral series of very large spots. Maxillary barbels reaching to the edge of the opercle. *fasciatum brevifile* 152b.

ee. Back and sides with narrow dark wavy lines which extend to the edge of the belly; fins variable, plain or spotted; head with small spots. Maxillary barbels not reaching to the dorsal. *fasciatum intermedium* 152c.

eee. Back and sides with narrow dark lines which form coarse reticulations; a series of spots along the lower part of the sides. Maxillary barbels reaching little beyond pectoral. *fasciatum reticulatum* 152d.

bb. Groove of the fontanel deep, continued to the base of the occipital process; a band of long cirri extending to midway between the eye and occipital process; the tips of the cirri not on a level with the surface of the bone bordering the fontanel; a deep transverse groove at base of occipital process and a shorter one extending outward and backward. Dark above, light below; about 16 curving cross bands half as wide as the eye, more or less joined below by an irregular lateral band; dorsal, caudal and anal with conspicuous spots; adipose fin barred and spotted with brown; head unspotted. *tigrinum* 153.

aa. Body with round black spots which occasionally are confluent into lines; groove of the fontanel not continued to the occipital process. Maxillary barbel extending beyond preopercle. *coruscans* 154.

152. Pseudoplatystoma fasciatum.

Silurus fasciatus Linnæus, Syst. Nat. ed. xii, i, 505, 1766; id. ed. xiii, 1359, 1788; Bonaterre, Enc. Ichthyol. 154, 252, 1788; Bloch, Ausland. Fische, part 8, 30, pl. 366, 1794; Bloch & Schneider, Syst. Ichthyol. 382, 1801.

Pimelodus fasciatum Lacépède, Hist. Nat. Poiss. v, 94, 99 and 100, 1803.

Platystoma fasciatum Cuv. & Val. Hist. Nat. Poiss. xv, 14, 1840 (copied); Kner, SB. Ak. Wien, xxvi, 401, 1857 (Surinam); Günther, Cat. Fish. Brit. Mus. v, 107, 1864 (Essequibo; Surinam; River Capin, Para); Peters, MB. Ak. Berlin, 469, 1877 (Calabozo); Steindachner, Fisch-fauna Magd. Stromes, 15, 1878 (Magdalen River); Cope, Proc. Am. Philos. Soc. xvii, 674, 1878 (Peruvian Amazon); Steindachner, Fisch-fauna Cauca & Flüsse bei Guayaquil 5, 1879 (Cauca); id. Ichthyol. Beitr. viii, 54 (Surinam); id. Flussfische Südam. iv, 4, 1882 (Rio Amazonas, Iquitos).

Pseudoplatystoma fasciatum Bleeker, Nederl, Tijdschr. Dierk. 1863, 97 (name only); id. Silures de Suriname, 72, 1864 (Surinam); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 138, 1888 (Obidos; Coary; Hyavary).

Platystoma truncatum Agassiz, Gen. & Spec. Pisc. Brazil, 27, plate xiii*a*. 1829 (Rio Japura & Solimoens). (Plain, dorsal and caudal spotted); Cuv. & Val., Hist. Nat. Poiss. xv, 20, 1840 (Brazil); Hyrtle, Denk. Ak. Wien. xvi, 17, 1859 (vertebræ 13+33); Günther, Cat. Fish. Brit. Mus. v, 108, 1864 (copied).

Platystoma punctifer Castelnau, Anim. Nouv. Rares de l'Amér. du Sud, 40, pl. xix, fig. 2, 1855 (Amazon).

Habitat: Amazons and streams north of it.

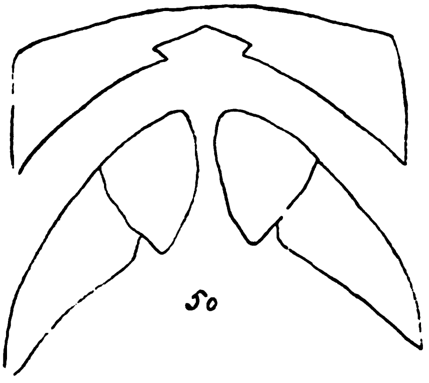
The color markings in this, as in the nearest related species, are very conspicuous in certain individuals; those about .40 m. long seem to have the color most distinct. In the smallest and largest specimens the black bars are scarcely evident, and the light bars are faint. *Platystoma truncatum* Agassiz, was based on a specimen .90 m. long, and is doubtless the old form of *fasciatus* or one of its varieties.

It is doubtful whether the extreme old of the varieties can be told apart.

Platystoma punctifer Castelnau does not differ from specimens of *fasciatus*.

Body long, slender, terete. Head long, depressed, scarcely narrowed towards the snout; its width at the angle of the mouth $1\frac{1}{3}$ in its greatest width, $2\frac{3}{5}$ in its length.

Eye 13 in head, 4–6 in snout, 2–3 in interorbital, about 4 diameters behind the angle of the mouth.



Teeth all alike, those in the lower jaw in a narrow band of uniform depth; those of the upper jaw in a band which is much shallower at the middle. Vomerine patches slightly separate along the median line.

Dorsal spine nearer to end of adipose than to tip of snout; slender, serrate behind and near tip in front. Adipose fin shorter than the anal, placed above the first 8 rays.

Ventrals extending one-half their length beyond the vent; distance from vent to caudal equals length of head.

Pectoral spine with strong recurved teeth on its entire inner margin, a few teeth near tip in front; 2¼ in head.

Head 2¾–2⅗; depth 7¼–7½; Br. 14–15; D. I, 6; A. 11–13.

About twenty specimens. Coary; Hyavary; Hyanuary; Jutahy; Teffé; Rio Puty; Obidos.

152 a. Pseudoplatystoma fasciatum nigricans.

P. f. nigricans E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 31, 1889.
Types: No. 7301 and 7311; two specimens .40–.60 m. Xingu.
Habitat: Xingu.

This variety is known only from the types; it is confined to the Xingu river.

152 b. Pseudoplatystoma fasciatum brevifile.

P. f. brevifile E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 31, 1889 (Goyaz).
Type: No. 7317; one specimen, .62 m. Goyaz.
Habitat: Goyaz.

152 c. Pseudoplatystoma fasciatum intermedium.

P. f. intermedium Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 138, 1888 (Obidos).
Four specimens, .37–.65 m. Obidos; Rio Puty.

152 d. Pseudoplatystoma fasciatum reticulatum.

P. f. reticulatum E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 30, 1889 (Rio Negro).

Type: No. 23,813; .77 m. Rio Negro.

153. Pseudoplatystoma tigrinum.

Platystoma tigrinum Cuv. & Val. Hist. Nat. Poiss. xv, 10, pl. 422, 1840 (Brazil); Schomburgk, Fishes of Guiana, part i, 185, pl. viii, 1841 (Rivers of Guiana); Castelnau, Anim. Am. Sud, 39, 1855 (Amazons); Günther, Cat. Fish. Brit. Mus. v, 107, 1864 (copied); Vaillant, Bull. Soc. Philom. series 7, iv, 151, 1880 (Calderon).

Platystoma fasciatum tigrinum Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 138, 1888 (Obidos).

Habitat: Amazon and northward; probably coextensive with *fasciatum*.

Eight specimens .25-1.00 m. Manaos; Obidos; Teffé; Jutahy.

This species differs from *fasciatum* in the character mentioned in the key.

154. Pseudoplatystoma coruscans.

Platystoma coruscans Agassiz, Gen. et Spec. Pisc. Bras. 26, 1829 (Brazil); Cuv. & Val. Hist. Nat. Poiss. xv, 17, 1840 (Rio San Francisco); Günther, Cat. Fish. Brit. Mus. v, 108, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 138, 1888 (Manaos; Rio das Velhas; Rio San Francisco below the falls).

Sorubim caparary Spix, Gen. et Spec. Pisc. Bras. 26, pl. xiii, 1829 (Rio San Francisco).

Platystoma caparary Castelnau, Anim. Am. Sud, 40, 1855.

Platystoma pardalis Valenciennes, Voy. d' Orbigny, ix, atlas ii, plate iv, fig. 2, 1847; Cuv. & Val. Hist. Nat. Poiss. xv, 15, 1840 (Buenos Ayres), Günther, Cat. Fish. Brit. Mus. v, 108, 1840 (copied).

Platystoma punctatum Cuv. & Val. Hist. Nat. Poiss. xv, 20, 1840 (name only).

Platystoma orbignianum Valenciennes, Voy. d' Orbigny, Atlas ii, plate iv, fig. 3, 1847; Cuv. & Val. Hist. Nat. Poiss. xv, 12, (Buenos Ayres: Parana to Corrientes); Günther, Cat. Fish. Brit. Mus. v, 107, 1864 (Cipo, tributary of Rio das Velhas); Lütken, Dan. Selsk. Skr. 1875, 154, fig. (Rio das Velhas).

Platystoma forschhammeri Reinhardt MS. in Lütken l. c.

Habitat: Rio Plata, Rio San Francisco and their tributaries.

The fishes named above are undoubtedly identical. The *pardalis* and *orbignianum* of Valenciennes were based on specimens 1.50 and .50 m. long respectively, and little value can be laid on their differences.

The specimens examined are from Rio das Velhas, and Rio San Francisco below the falls.

Body long, slender, terete, head very long, more depressed than in other species; maxillary barbel extending beyond preopercle; mental barbels to pectoral or shorter; postmental barbels almost to tip of pectoral; width of head at rictus scarcely narrower than its greatest width; 2⅓ in its length; greatest depth of head 4 in its length.

Eye 13 in head, 6 in snout, 3½ in interorbital, 3½ diameters from angle of mouth.

Teeth all alike, arranged as in *fasciatum*.

Gill-membranes separate to beyond eye; gill-rakers short, spine-like, not overlapping, 1+8.

Dorsal spine nearer posterior margin of adipose dorsal than to tip of snout.

Adipose fin shorter than base of anal.

Caudal deeply two-lobed, the outer rays 4 times as wide as an interradial space, the lobes rounded.

Ventrals extending ½ their length behind vent. Distance from vent to anal about equal to 6 diameters of the eye, from vent to the caudal ⅓ longer than the head.

Pectoral spine finely serrate behind, 2½ in head; pectoral pore minute.

Head 2⅘; depth 7; Br. 15 or 16; D. I, 6; A. 14.

XXXVI. SORUBIM.

Platystoma Agassiz, Gen. et Spec. Pis. Bras. 1829 (sp.) (name preoccupied in Diptera).

Sorubim Spix, Gen. et Spec. Pisc. Bras. 1829 (sp.)

Sorubim Bleeker, Nederl. Tijdschr. Dierkunde, i, 1862, Systema Sil. Rev. 22 *(lima)*.

Tpye: *Silurus lima* Bloch & Schneider.

Neither Agassiz nor Spix indicated types for their genera *Platystoma* and *Sorubim*, which, as used by them, are coextensive. Bleeker first restricted the genus *Sorubim* to the *Silurus lima* Bloch & Schn.; he also restricted *Platystoma* to the same species, making *Platystoma* a synonym of *Sorubim*. The name *Platystoma*, however, is preoccupied, and we retain the name *Sorubim*.

Head abnormally depressed, the eyes perfectly lateral; teeth of the upper jaw in a band which is wider than deep; teeth on roof of mouth in four patches, the vomerine patches joined in the adult; barbels fleshy; adipose fin shorter than anal; dorsal spine equidistant from snout and posterior margin of adipose fin; plates on the anterior portion of the lateral line.

155. Sorubim lima.

Silurus lima Bloch & Schneider, "Syst. Ichthyol. 384," 1801.

Platystoma lima Agassiz, Gen. Spec. Pisc. 24, 1829 (Equatorial Brazil); Cuv. & Val. xv, 7, 1840 (locality?); Kner, SB. Ak. Wien, xxvi, 399, 1857 (Rio Guaporé; Rio Branco; Rio Negro).

Sorubim lima Günther, Cat. Fish. Brit. Mus. v, 105, 1864 (copied); Peters, MB. Ak. Berl. 469, 1877 (Calabozo); Steindachner, Fisch-fauna des Magd. Stromes 15, 1878 (Rio Magdalena); Cope, Proc. Am. Philos. Soc. xvii, 674, 1878 (Peruvian Amazon); Steindachner, Fisch-fauna Cauca & Flüsse bei Guayaquil, 5, 1879 (Cauca in the province Antiochia); Vaillant. Bull. Soc. Philom. Ser. 7, iv, 150, 1880 (Calderon); Steindachner, Flussfishe Südam. iv, 4, 1882 (Rio Huallaga); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 138, 1888 (Manacapuru; Sao Paolo; Fonteboa; Tabatinga; Hyavary; Teffé; Obidos; Marañon; Ucayale; Iça; Lago do Manimo; Para; Rio Puty; Jutahy).

Sorubim infraocularis Spix, Gen. et Spec. Pisc. Bras. pl. xv, 1829 (Equatorial Brazil).

Platystoma luceri Weyenbergh, Nuevos Pescados, 10, pl. iii, figs. 1-3, 1877 (Santa Fe).

Habitat: Rio Plata; Amazons and tributaries to the Rio Magdalena and its tributaries.

Body elongate, subcylindrical; head abnominally depressed, its depth 5 in its length; eye strictly lateral; maxillary barbel extending past front of dorsal; mental barbel extending beyond eye; postmental slightly beyond head.

Eye 10½ in head, 5 in snout, 4¼ in interorbital space; 2 diameters behind angle of mouth.

Teeth all alike; those of the upper jaw in a broad crescent-shaped patch; its depth at the middle being one-half its width; teeth on vomer and palate in four patches forming a horse-shoe.

Gill-membranes separate to in front of eye; gill-rakers overlapping, 3+13. Dorsal spine 2⅓ in head. Adipose fin shorter than the anal.

Caudal deeply lobed, lower lobe longer and wider, 2 in head; the rays normal.

Ventrals extending two-thirds their length beyond the vent; eye 3½ in distance from vent to anal.

Pectoral spine 2 in head; teeth on its posterior edge and near the tip on its anterior margin; pectoral pore moderate.

Color brownish above; lower half of body and head white; a dark lateral band extending upon the caudal.

Head 3; depth $7\frac{6}{7}$; Br. 13; D. I, 6; A. 18; large thin plates on the anterior portion of the lateral line.

Numerous specimens; Manacapuru; Sao Paolo; Fonteboa; Tabatinga; Hyavary; Teffé; Obidos; Marañon; Ucayale; Iça; Lago de Manimo; Para; Rio Puty; Jutahy; Rio Sario.

XXXVII. SORUBIMICHTHYS.

Platystoma Agassiz, Gen. et Spec. Pisc. Bras. 1829 (sp.)

Sorubim Spix, Gen. et Spec. Pisc. Bras. 1829 (sp.)

Sorubimichthys Bleeker, Nederl. Tijdschr. Dierk. i, 98, 1863 *(jandia=spatula)*.

Type: *Platystoma spatula* Agassiz.

The species of this genus are not well known; only one, *planiceps*, is represented in more than one museum. It is not improbable that all should be referred to one or at most to two species.

Snout very broad; eyes superior; upper jaw much longer than the lower, teeth in upper jaw in a very deep band, those on roof of mouth in two patches; barbels fleshy; adipose fin shorter than anal; dorsal spine equidistant from snout and middle of adipose fin. Caudal widely forked, the rays normal.

ANALYSIS OF THE SPECIES OF SORUBIMICHTHYS.

a. Upper part of body brownish, with numerous darker spots; maxillary barbels longer than head. *planiceps* 156.

aa. Color of body uniform.

- *b*. Head, dorsal, pectoral and ventral fins with numerous black dots; maxillary barbels extending to the ventrals; caudal lobes pointed; pectoral with teeth along both margins. D. I, 6; A. 10. (Agassiz.) *spatula* 157.
- *bb*. Uniform grayish brown, darker above. Head covered with skin; maxillary barbels much shorter than the head, mandibulary barbels still shorter; intermaxillary band of teeth broader than the vomerine band, separated from each other by a very narrow interspace; dorsal spine equidistant from snout and origin of adipose fin; adipose fin as long as anal; caudal slightly forked. Head 3⅜; D. I, 6; A. 11. (Günther.) *gigas* 158.

156. Sorubimichthys planiceps.

Mystus No. 6, Artedi, in Seba, iii, 84, pl. 29, fig. 6.

Mystus No. 386, "Gronow Zoophyl. 125."

Platystoma planiceps Agassiz, Gen. Spec. Pisc. Bras. 25, 1829 (Amazon; Solimoens; Rio Negro); Cuv. & Val. Hist. Nat. Poiss. xv, 19, 1840 (Brazil); Schomburgk, Fishes of Guiana, part i, 187 (Rio Branco, not in Guiana); Kner, SB. Ak. Wien, xxvi, 400, 1857 (Rio Negro); Günther, Cat. Fish. Brit. Mus. v, 106, 1864 (copied); Peters, MB. Ak. Berl. 469, 1877 (Calabozo).

Sorubimichthys planiceps Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 139, 1888 (Manacapuru; Teffé; Hyavary).

Sorubim piranaca Spix, Gen. Spec. Pisc. Bras. 25, plate xii, 1829.

Platystoma artedii Günther, Cat. Fish. Brit. Mus. v, 106, 1864 (based on Artedi & Gronow); Vaillant, Bull. Soc. Philom. ser. 7, iv, 150, 1880 (Calderon).

Sorubimichthys ortoni Gill, Proc. Acad. Nat. Sci. Philad. 1870, 94 (Peruvian Amazon).

Habitat: Amazons, Orinoco and their tributaries.

The specimens examined are from Manacapuru, Hyavary and Teffé .51–.70 m.

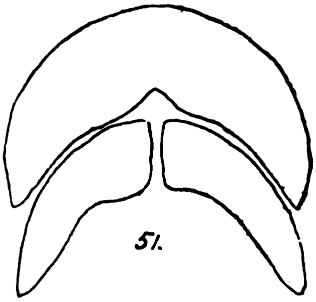
The specimen from Teffé has the markings most distinct, the back most decidedly ashy and the spots black.

Body long and slender, eel-shaped behind the dorsal fin; head more than usually flattened, its width at the rictus scarcely less than its greatest width which is 2 in the length of the head, its greatest depth about 5 in its length. Upper jaw projecting beyond the lower the depth of its intermaxillary band of teeth, or 2½ orbital diameters.

Eye small, 17 in head, 7 in snout, 5½ in interorbital; 1 diameter behind the rictus.

Bony base of the maxillary barbel 2½–3 orbital diameters long, the tip of the barbel reaching past base of ventrals; mental barbels minute, 1½ orbital diameters long; postmentals not reaching base of pectoral.

Teeth minute; mandibulary band ¾ orbital diameter deep; intermaxillary band 2½ orbital diameters deep, an angular incision in the middle of its posterior border; teeth on the vomer and palate in two semi-crescentic patches.


57.

Gill-membranes separate to below the angle of the mouth; gill-rakers scarcely overlapping, strong, spine-like, 3+12.

Dorsal spine 2⅓–3 in head. Adipose dorsal slightly shorter than anal. Caudal widely forked, the lobes pointed.

Ventrals extending ¼ their length beyond vent; distance of vent from anal equals 8 diameters of the eye; its distance from the caudal ⅓ longer than head.

Pectoral spine 2 in head; strong teeth along posterior margin and near its tip anteriorly. Pectoral pore very large.

Color ashy above with round spots, most numerous on head, decreasing in number and increasing in size posteriorly; middle of sides with a white band bordered above and below with brown; these colors extending on tail; lower parts white with scattered spots. Dorsal with dark brown spots; adipose with larger spots.

Head 3; depth 9; Br. 14 or 15; D. I, 6; A. 12 or 13.

157. Sorubimichthys spatula.

Platystoma spatula Agassiz, Gen. Spec. Pisc. Bras. 26, 1829 (Brazil); Cuv. & Val. Hist. Nat. Poiss. xv, 17, 1840 (Brazil); Günther, Cat. Fish. Brit. Mus. v, 106, 1864 (copied).

Sorubimichthys spatula Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 139, 1888 (name).

Sorubim jandia Spix, Gen. Spec. Pisc. Bras. plate xiv, 1829 (Equatorial Brazil).

Habitat: ? Amazon.

This species was based on a specimen about one metre long, "more than 3 feet." It differs from *S. planiceps* chiefly in color. A second specimen has not yet been found, and it is not unlikely that it is identical with *planiceps*.

158. Sorubimichthys gigas.

Platystoma gigas Günther, Ann. & Mag. Nat. Hist. 1872, x, 449 (Rio Huallaga).

Sorubimichthys gigas Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 139, 1888 (name).

Habitat: Rio Huallaga.

This species was based on a specimen two metres long. We cannot detect any differences between this species and *planiceps* that could not be accounted for by age. As we have not been able to examine specimens of such large proportions, we retain this as a distinct species.

XXXVIII. PLATYSTOMATICHTHYS.

Platystoma Kner, SB. Ak. Wien, xxvi, 1857, 395, fig. 9 (sp).

Platystomatichthys Bleeker, Nederl. Tijdschr. Dierkunde, i, 98, 1863 (*sturio*).

Type: *Platystoma sturio* Kner.

This genus consists of a single species, the most aberrant of the species with depressed and elongate heads.

Head rather narrow, depressed anteriorly; snout long and pointed, projecting far beyond the lower jaw, its entire under surface covered with teeth; vomerine teeth in a single patch, palatine teeth in elongate patches removed from the vomerine teeth; eyes superior. Maxillary barbels much longer than the total length, osseus or wiry; adipose fin longer than anal; caudal deeply forked, the lobes pointed, half as long as body or longer.

159. Platystomatichthys sturio.

Platystoma sturio Kner, l. c. (Rio Branco.)

Platystomatichthys sturio Bleeker, Nederl. Tijdschr. Dierkunde, i, 98, 1863 (name only); Günther, Cat. Fish. Brit. Mus. v, 110, 1864 (Rio Branco); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 139, 1888 (Para; Curuca, Rio Muria).

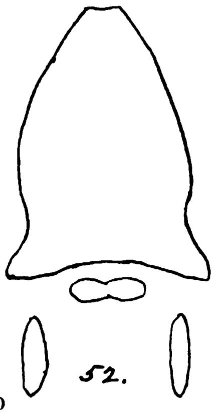
Habitat: Amazon and its tributaries.

The specimens examined were collected by the Conts de Magalhaes and Prof. Agassiz at Para and Curuca on the River Muria.

Body rather slender; head long acuminate, the prolongation of the snout beyond the lower jaw being contained 2¼ in head; width of the head at the mouth 1⅗ in its greatest width, 3½ in length of head.

Maxillary barbel osseus or wiry more than half its length; mental barbels remote from each other, not extending to pectoral, 2½ diameters of eye from lower lip; postmental barbels beyond base of pectorals.

Eye 12 in head; 8½ in snout, 3 diameters from angle of mouth, 4 diameters from maxillary barbel.



Teeth of lower jaw, as in most species of this group, in a narrow band; those of the upper jaw in an arrow-shaped patch, those of the vomer in an ∞-shaped patch; the palatine patches long and narrow, remote from the vomerine patches; lower lip plicate.

Gill-membranes separate to beyond eye; gill-rakers overlapping, 5+14.

Roughened plates on the lateral line anteriorly.

Dorsal spine behind middle from tip of snout and end of adipose dorsal; long, slender, with recurved teeth behind; $2\frac{1}{2}$ in head. Adipose fin longer than base of anal.

Caudal very deeply forked; the outer rays more than half length of body; numerous basal rays.

Ventrals extending for $\frac{3}{5}$ of their length beyond the vent; distance from vent to anal equals 4 diameters of the eye; distance from vent to middle caudal rays equals length of head.

Pectoral spine $2\frac{1}{3}$ in length of head; with retrorse teeth behind. A pectoral pore.

Uniform light brown, silvery below; several large round black spots on sides; usually one on base of upper lobe of caudal fin.

Head $2\frac{3}{4}$–$2\frac{3}{5}$; depth $7\frac{1}{2}$; Br. 9 or 10; D. I, 6; A. 12.

SUBFAMILY DORADINÆ.

ANALYSIS OF THE GENERA OF DORADINÆ.

a. Barbels all simple.
  b. Eye in anterior portion of head; snout depressed; teeth well developed.
    c. Humeral process much shorter and weaker than the coracoid process. No adipose dorsal; gill-openings greatly reduced. Clavicle and coracoid forming a large shield below. PHYSOPYXIS XXXIX.

cc. Humeral process much longer and stronger than the coracoid process; lateral plates not meeting on the back in front of a point midway between the dorsal fins. DORAS XL.

bb. Eye situated in the middle or behind the middle of the head. OXYDORAS XLI.

aa. Maxillary and sometimes the mental barbels fringed. Eye large. Teeth rudimentary or absent. HEMIDORAS XLII.

XXXIX. PHYSOPYXIS.

Physopyxis Cope, Proc. Philad. Acad. Nat. Sci. 1882, 273 (*lyra*).

Clavicles and coracoids greatly developed below, forming a shield which extends forward to below the eyes; coracoid process extending to beyond the base of the ventrals. Gill-openings much reduced. No adipose dorsal. Teeth minute, in several series.

160. Physopyxis lyra.

Physopyxis lyra Cope, l. c. (Ambyiacu River).
Habitat: Ambyiacu River.

Muzzle short and broadly truncated. Eye 4⅓ in the head, 1 in the snout, 3 in the concave interorbital. Dorsal plate keeled, roof-shaped, its posterior processes ending behind the last dorsal rays. Humeral process striate, extending to below the dorsal spine. Postcoracoid processes striate. Prenasal bones pectinate. Dorsal spine straight, grooved, spiny on its lower half in front, smooth behind. Pectoral spine large, curved, extending to the second or third anal ray. Caudal truncate. Head dark brown, a light band from one humeral base to the other; another between the orbits. Posterior parts yellowish, a dark spot at the base of the dorsal, a band on the middle of the sides and one at the base of the tail.

D. I, 4; A. 12; V. 6; P. I, 2. (Cope).

XL. DORAS.

Doras Lacépède, Hist. Nat. Poiss., v, 116, 1803 (*carinatus* and *costatus*).

Doras Cuv. & Val., Hist. Nat. Poiss. xv, 267, 1840 (*costatus*).

Centrochir Agassiz; Gen. et Spec. Pisc. Bras. 14, 1829 (*crocodili*).

Lithodoras Bleeker, Nederl. Tijdschr. Dierkunde, i, 84, 1863 (*lithogaster*).

Pterodoras id. l. c. (*granulosus*).

Platydoras id. l. c. 86 (*costatus*).

Acanthodoras id. l. c. (*cataphractus*).

Astrodoras id. l. c. (*asterifrons*).

Amblydoras id. l. c. (*affinis*).

Zathorax Cope, Proc. Phil. Acad. Nat. Sci. 1872, 271 (*monitor*)=*Astrodoras* Bleeker.

Agamyxis Cope, Proc. Amer. Philos. Soc. xvii, 101, 1878 (*pectinifrons*).

Type: *Silurus costatus* Linnæus.

The numerous genera into which this group has been divided seem to us hardly tenable. It is true that if only the types of these genera existed they might be separated generically, but if the other species are taken into consideration the intergradations are too perfect to admit of division.

Prof. Cope (Proc. Acad. Nat. Sci. Philad. 1874, 133) says: "*Doras heckelii* pertains to this genus" (*i. e. Zathorax*). *D. hekelii* is certainly congeneric with *D. asterifrons*, the type of *Astrodoras* of which *Zathorax* is therefore a synonym.

Anterior nares on or near the upper lip; snout short, the eye in anterior half of the head; teeth well developed; adipose fin usually with a well defined anterior margin.

Habitat: Rio Plata; Rio San Francisco and the rivers north of it. No species of Doras have as yet been found in the Parahyba, Rio Doce and Jequitinhonha. Two species are found in the San Francisco.

ANALYSIS OF THE SPECIES OF DORAS.*

a. Prenasal bone not crest-like, sometimes granular, sometimes entirely covered with skin, sometimes with rather prominent spines.

b. Pectoral fin consisting of a spine and soft rays.

c. Dorsal surface with a series of plates between the dorsal and adipose fins. Lat. l. 16-20; a groove extending backward from the fontanel. (Lithodoras.) *dorsalis* 161.

cc. Dorsal surface without plates between the dorsal and adipose fins.

d. Dorsal spine serrate on both margins. (Doras=*Platydoras*.)

e. Caudal peduncle naked above and below.

f. Lateral scutes 18, decreasing in height backward, their entire free surface covered with short spines. D. I, 6; A. 6. V. 6. *uranoscopus* 162.

ff. Lateral scutes 26-30.

g. Fins with round spots; pectoral spine reaching to below third dorsal ray. Fontanel continued as a groove to tip of dorsal plate. Eye 10 in the head. *granulosus* 163.

gg. Fins plain, except the caudal; pectoral spine reaching beyond origin of ventrals. Fontanel not continued as a groove. Eye 4 in the head; interorbital flat; postorbital part of the head roof-shaped. Maxillary barbels reaching beyond middle of pectoral spine; postmentals not to posterior margin of opercle. Humeral process extending to middle of pectoral spine. Sides of the body grayish violet; each lobe of the caudal fin with a rather broad violet band. Head 4; D. I, 6;A. 13; P. I, 7; V. 7; Lat. l. 29-30. (Steindachner.) *longispinis* 164.

ee. Caudal peduncle with plates above and below.

h. No lateral band.

i. Sides and belly spotted with white; lateral plates high, with 2 accessory spines above and 2 below the median hook; caudal plates spiny. Humeral process reaching to the fourth lateral plate, with two series of spines. Maxillary barbels reaching to base of pectorals. D. I, 6; A. 11-12; V. 6; Lat. l. 29. *albomaculatus* 165.

ii. Sides plain or spotted with dark brown.

j. Whole surface of the lateral scutes covered with minute spines. Black; dorsal fin white, its center black; base of anal fin and two posterior rays white. D. I, 6; A. 12; P. I, 8; V. 8; Lat. l. 32-34. (Günther.) *helicophilis* 166.

jj. Lateral plates with ridges radiating from the median hook and terminating in a short spine, one above and one below the median hook on the middle and posterior plates. Brown, a darker spot behind each median hook. D. I, 6; A. 12; P. I, 7; V. 7; Lat. l. 31. *dentatus* 167.

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*Many of the species of this genus are known only from poor descriptions, and the following "key" could, therefore, be made with no degree of satisfaction.

hh. A yellow lateral band.

k. Lateral bands meeting above the eyes.

l. Humeral process four times as long as high. *costatus* 168.

ll. Humeral process twice or thrice as long as high; a light line along the back. D. I, 6. *armatulus* 169.

kk. Lateral bands not meeting above the eyes.

m. Lateral scutes high, covering the whole side of body and tail, extending to base of anal, the scutes with numerous longitudinal ridges, each of which ends in a marginal point. Humeral process broader than the pectoral spine. Brown, a lighter lateral band. D. I, 6; A. 9; P. I, 6; V. 7; Lat. l. 29–33. (Günther.) *hancockii* 170.

mm. Lateral scutes low, except those below dorsal fin which are very high. Dorsal spine as high as half its distance from tip of snout. Pectoral spine flat, striate on sides, reaching to the ventral fins. Eye 8¼ in the head, more than 2 in the interorbital. Maxillary barbels reaching middle of humeral process, mental barbels half as long. Head flat; dorsal plate steeply roof-shaped. Humeral process striate. Caudal deeply forked. D. I, 6; A. 11; V. 7; P. I, 8; Lat. l. 40. (Cope.) *brachiatus* 171.

dd. Dorsal spine serrate in front, not behind. (ACANTHODORAS.)

n. Caudal rounded.

o. Dorsal spine serrate on anterior margin only; D. I, 5. *calderonensis* 172.

oo. Dorsal spine serrate on anterior margin and on sides.

p. Lateral scutes not meeting above and below on caudal peduncle; a light lateral band and a dorsal band. Body broader than deep; depth of the head 1¼ in its length; eye 5 in the head, 2⅓ in the interorbital; anterior margin of the orbit spiny. Maxillary barbels extending past the base of the pectorals; lower jaw scarcely shorter than the upper; width at angle of mouth 1½–1¾ in the head. Humeral process extending to near the tip of the pectoral spine. Lateral plates with a marginal series of spines. Dorsal spine with a serrate ridge on each side. Head 4¼; depth 4⅕–4¼; D. I, 4–5; P. I, 4–5; V. 6; A. 9–12; Lat. l. 25–30 (compiled). *cataphractus* 173.

pp. Lateral scutes meeting above and below on caudal peduncle. A light lateral band, numerous white spots on sides, especially on the belly. Dorsal spine with two or three spiniferous ridges on its sides; spines on basal half of caudal fin. *spinosissimus* 174.

nn. Caudal emarginate; humeral process wide, sword-shaped; snout entirely covered with skin; adipose fin longer than the dorsal fin. *marmoratus* 175.

ddd. Dorsal spine smooth on both margins. (AMBLYDORAS.)

q. Caudal rounded; head not keeled, fontanel small, oval; eyes longer than the snout, 1 in the interorbital. Prenasal bone finely dentate. Maxillary barbels reaching to the tip of the humeral process. Lateral plates almost entirely covered with skin, with a median hook and marginal spines. Pectoral spine longer than the dorsal spine, reaching beyond base of ventrals; caudal rounded. Back brown, lower surface light, everywhere spotted with darker. Caudal barred. D. I, 6; A. 12; P. I, 5; V. 7; Lat. l. 25-26. *affinis* 176.

qq. Caudal emarginate; lateral scutes low; a light band extends obliquely upward from base of pectoral to the lateral scutes, thence backward to the caudal fin; three large, elongate, dark blotches above and below the lateral band. *weddellii* 177.

bb. Pectoral spine consisting of a spine only;* caudal rounded. (CENTROCHIR.) *crocodili* 178.

aa. Prenasal bone raised, crest-like, deeply pectinate.

r. Dorsal spine serrate on both margins; caudal rounded; V. 6; caudal portion of the body covered with spiny plates above and below; lateral scutes high. (AGAMYXIS.)

s. Coracoid process armed, forked behind; lateral scutes meeting on the back midway between the dorsal fins and thence backward; barbels reach base of pectoral fins; lateral scutes with their surface spiny, extending to middle of caudal fin; sides of the dorsal and upper surface of the pectoral spine spiny, the lower surface of the latter striate. Deep brown with a light lateral band. D. I, 4; A. 11; P. I, 5; Lat. l. 28. (Schomburgk.) *castaneo-ventris* 179.

ss. Breast entirely covered with skin; upper and lower surfaces of the caudal region with spiny-margined shields; superciliary margin pectinate; two serrate ridges on the premaxillary processes; preopercular angle with a serrate crest; two spinous ridges on each side of the dorsal and pectoral spines. Humeral process with an external series of straight spines. Maxillary barbels not extending to base of pectoral. Black, ventral surface spotted with white; caudal with a light cross-bar. D. I, 5; A. 12; P. I, 5; Lat. l. 27. (Cope.) *pectinifrons* 180.

rr. Dorsal spine grooved or serrate in front only; V. 7; caudal peduncle without spiny plates above or below; part of the breast with striate dermal ossifications; breast very wide. (ASTRODORAS.)

t. Dorsal spine serrate in front; lateral scutes with accessory spines above the median hook; caudal slightly emarginate.

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*Probably an oversight.

u. **Superciliary edges much raised, the interorbital deeply concave; coracoid bone striate, its process sharply granular; a single plate above and below immediately in front of the caudal fin; two high smooth ridges on each side of the dorsal spine. Lat. l. 24–25.**
asterifrons **181.**

uu. **Superciliary edges little raised, the interorbital nearly flat; processes of the coracoid bones striate; caudal peduncle without plates above and below; four or five deep grooves on each side of the dorsal spine. Lat. l. 29–30.** *heckelii* **182.**

tt. **Dorsal spine grooved, not serrate; caudal truncate; lateral scutes each with a single large recurved hook.**

v. **Entire lower surface of the clavicle and coracoid bones with striate dermal ossification; maxillary barbel reaching posterior margin of orbit; eye 3¾ in the head, 1⅓ in the interorbital. Humeral process with a series of strong spines, reaching the vertical from end of dorsal plate. Pectoral spine extending beyond the ventrals; pale brown, the pectoral spine dark spotted. Head 3¼; depth 3⅓; D. I, 6; A. 12; P. I, 6; Lat. l. 25. (Cope.)**
monitor **183.**

vv. **Coracoid surface only with dermal ossification; mental barbels reaching tip of coracoid process, maxillary to end of pectoral spine; eye 3 in the head, 1 in the interorbital. Pectoral spine extending past base of ventral fins. Brown above; a yellow band along middle of sides bordered above with red, below with black; belly white, purple below the pectoral; caudal fin with vertical bars. Head 3 to middle of caudal. D. I, 6; A. 12; P. I, 4; Lat. l. 26. (Cope.)** *nauticus* **184.**

161. Doras dorsalis.

Doras carinatus **Val. in Humb. Observ. Zool. ii, 184 (not *Silurus carinatus* L).**

Doras dorsalis **Cuv. & Val. xv, 284, 1840 (Cayenne); Kner, SB. Ak. Wien, xvii, 1855, Ichthyol. Beitr. 128 (Para Rio); Günther, Cat. Fish. Brit. Mus. v, 205, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 159, 1888 (Para).**

Doras papilionatus **Fillippi, Guér. Ménev. Rev. & Mag. Zool. 167, 1853 (Amazons); Günther, l. c. (copied).**

Doras lithogaster **Heckel, MS. in Kner, SB. Ak. Wien, xvii, 132, 1855 (Forte do Rio Branco); Günther, l. c. (copied).**

Lithodoras lithogaster **Bleeker, Nederl. Tijd. Dierkunde, i, 15, 1863 (name only).**

Habitat: Para; Rio Negro and Cayenne.

The characters assigned to *papilionatus* are not of sufficient value to separate it from *dorsalis*. *Doras lithogaster* is probably the old of *dorsalis*.

Depth below the dorsal spine about equal to the width. Caudal peduncle slender, not as wide as deep. Head little shorter than wide, its depth equal to its width. Humeral process, upper half of opercle, suborbitals, prenasal and bones of the top of the head all rather finely granular. Interorbital area flattish, the head becoming more and more roof-shaped backwards to the dorsal plate which has its sides very steep. The postorbital portion of the profile arched. Dorsal plate not prolonged behind the first dorsal ray but with a strong descending process behind. Superciliary margins not raised, deeply emarginate; the prenasal bone large and roughened on its edge. Fontanel a narrow slit about as long as the eye, situated in a clavate depression. A marked groove extends from it to the tip of the dorsal plate.

Eye well protected by dermal ossification; 2–1½ in the snout, 4½–6 in the head, 2–2¼ in the interorbital.

Maxillary barbels about reaching the tip of the humeral process, somewhat longer in the young and somewhat shorter in the adult; postmental barbels not reaching to the base of the pectoral spine; mental barbels 3 or 4 times as long as the eye.

Snout rather narrow, covered with short papillæ, its width at the rictus 2½ in the head. Upper jaw projecting; teeth all villiform, the intermaxillary band 5 times as wide as deep.

Gill-membranes separate to below the middle of the opercle; breast entirely covered with skin.

First two or three lateral plates touching the dorsal plate above, the last one of them highest, those behind it decreasing in height to the last, the median hooks increasing in strength from in front backward to those on the middle of the caudal peduncle. A series of plates of varying sizes between the dorsal and the caudal; usually a plate on each side of the adipose fin which sometimes are joined in front partially surrounding the adipose fin. The dorsal plates vary independently of the size of the fish and sometimes they are entirely absent; those in front of the adipose fin are sometimes large, while there are none behind it and the reverse is sometimes true. Lower surface of the caudal peduncle and sometimes the region behind the ventrals with a series of plates similar to those on the back.

Humeral process narrow and pointed, reaching a little beyond the middle of the pectoral spine, its surface simply granular without ridges or spines.

Distance of the dorsal spine from the snout 2½ to 2⅔ in the length; dorsal spine about as long as the head; serrated on both margins, the spines of the anterior margin becoming larger and fewer towards the tip, but not as large as the corresponding ones on the posterior margin; the serrations stronger than in any other species of this genus; sides of the spine striate. Distance of the adipose fin from the dorsal fin 3½–4¼ in the length; adipose fin oval, much shorter than the dorsal fin. Caudal deeply forked, 3⅓–4 in the length.

Anal fin truncate, the fifth ray highest, 1⅖ in the head.

Pectoral spine strong, straightish, reaching to the fifth or sixth lateral scute; its margins with fewer but stronger serræ than the other species of the genus; pectoral pore very small.

Region above the lateral scutes brown, region below them lighter; sides of the head and anterior portion of the body with minute dark dots. Fins all more or less dusky; lobes of the caudal fin yellow, middle rays dark brown; anal sometimes with a dark spot at its base.

Head 4⅓; depth 4–5; Lat. l. 16–20; D. I, 6; A. 13 or 14; V. 7; P. I, 8.

Over forty specimens .16–.30 m. long. Para. Agassiz and Bourget.

162. Doras uranoscopus.

Doras uranoscopus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 159, 1888 (L. Hyanuary).

Habitat: Lake Hyanuary.

Body rather heavy, depressed, depth below the dorsal spine ¾ as great as the width; caudal peduncle rather slender, wider than high. Width of the head 1⅙ in its length; top of the head to near tip of snout, opercle, preopercle, suborbital and prenasal bones striate, the striæ becoming broken up into granules in places, which on the dorsal plate are spine-like, similar to those on the lateral scutes. Dorsal plate not continued behind the anterior margin of the dorsal spine; with a downward directed process. Interorbital area flattish; posterior portion of the head obtusely keeled. Fontanel clavate, not extending to the posterior margin of the eye; an elongate diamond-shaped depressed area behind it.

Eye 3½–4 in the snout, 8½ in the head, 3 in the interorbital; eye looking upward more than sideward.

Maxillary barbels extending to posterior 4th of humeral process; postmentals to opposite the insertion of the inner pectoral ray; mentals about ⅔ as long as the postmentals.

Snout pointed, its width at the rictus 2½ in the head. Upper jaw projecting; teeth villiform, the intermaxillary band about 6 times as wide as deep.

Gill-opening extending to a point midway between upper angle of preopercle and the eye.

Lateral scutes high, the 3rd hook-bearing one the highest, 1¾ in the length of the head, the scutes decreasing in height to the last, the median hooks increasing in size to the caudal peduncle, the exposed surface of those in front of the peduncle thickly set with small spines. Accessory rays of the caudal fin ossified, the anterior one forming a small plate. Exposed part of the skin verrucose.

Humeral process narrow, tapering backward, reaching a little beyond the middle of the pectoral spine.

Distance of the dorsal fin from the snout about $2\frac{2}{5}$ in the length. Dorsal and pectoral spines with the sides deeply furrowed, both margins serrate; the serration of the posterior margin of the dorsal spine reduced to a few spines. Adipose fin low, merging into the profile of the back anteriorly.

Caudal emarginate, 5 in the length.

Anal high, rounded, first ray highest, 2 in the head.

Ventral as high as the anal fin.

Pectoral spine not quite reaching the ventral fins. Pectoral pore minute.

Fins spotted with brown.

Head 4; depth 5; Lat. l. 18; D. I, 6; A. (injured?) 6; V. 6; P. I, 9.

163. Doras granulosus.

Doras granulosus Valenciennes in Humboldt, Obs. Zool. ii, 184.

Pterodoras granulosus Bleeker, Nederl. Tijdschr. Dierkunde, i, 15, 1863 (name only); id. Silures de Suriname, 36, 1864 (Surinam).

Doras maculatus Valenciennes, Voy. d'Orbigny, ix, atlas ii, plate v, fig. 3, 1847; Cuv. & Val. Hist. Nat. Poiss. xv, 281, 1840 (Buenos Ayres); Steindachner, Denk. Ak. Wein, 28, 1879 (Rio de la Plata); Eigenm & Eigenm, Proc. Cal. Acad. 2d Ser. i, 160, 1888 (Arary?).

Doras murica (Natt. MS.) Kner, SB. Ak. Wein, xvii, 129, 1885 (Cujaba).

Doras muricus Günther, Cat, Fish. Brit. Mus. v, 202, 1864 (Demarara?).

Habitat: Rio Plata and its tributaries; Amazon; Demarara?. Rare.

Robust, little deeper than wide below the dorsal spine, caudal peduncle very slender, as wide as deep. Head as broad as long, its depth $1\frac{1}{5}$ in its length. Surface of the bones of the head sparsely granular. Fontanel elongate, extending far beyond the eye both forward and backward, continued except in very old as a groove to the tip of the occipital process.

Interorbital area flat, granular ridges bordering the fontanel; transverse profile above the opercle strongly arched. Nasal bones covered with skin, slightly serrated on their upper margin. Snout, sides of the head and humeral region thickly covered with small papillæ; sides of the head with a few conspicuous mucous canals.

Eye small, not especially protected by serrations; 3 in the snout, about 10 in the head, 3½ in the interorbital; suborbitals granular in the old.

Maxillary barbels reaching second or posterior third of the pectoral spine, beyond tip of humeral process; postmentals past its base; mentals two-thirds as long as the postmentals.

Snout bluntish, its width at the rictus 2¼ in the head, its length about equal to half its width. Upper jaw projecting, the intermaxillary band of teeth partly exposed. Teeth all setiform.

Gill-openings continued forward to below the upper angle of the preopercle.

Breast entirely covered with skin.

Second lateral scute short, much higher than the rest, the humeral region in front of the first lateral scute, with a small concealed plate. Each lateral scute with a large median hook without marginal spines; those toward the tail becoming longer. No plates on the dorsal or ventral surfaces.

Humeral process much narrower than the pectoral spine, reaching to below first lateral scute, its surface granular.

Distance of the dorsal fin from the snout 2⅓ in the length; dorsal spine as high as length of head, its sides almost smooth, both margins strongly serrate. Space between dorsal and adipose fins equal to the length of the dorsal fin, much longer in old. Adipose fin longer than the dorsal fin, becoming gradually lower in front, shorter than dorsal in old.

Caudal long, deeply forked, 3½ in the length.

Anal fin much higher than long, obliquely truncate, the 4th ray highest, 1⅓ in the head.

Ventrals reaching the anal fin, 1⅓ in the head.

Pectoral spine long and strong, reaching to below 3d dorsal ray, almost smooth on sides, strongly serrate on both margins.

Rusty brown, lighter below; fins and back with round brown spots.

Head 4–4½; depth 4–4½; D. I, 6; A. 12; V. 7; P. I, 8.

Five specimens .24–.92 m. Arary?; Uruguay; Buenos Ayres; Serpa.

164. Doras longispinis.

Doras longispinis Steindachner, Fisch-fauna, Magd. Stromes, 23, pl. iv, fig. 2, and pl. i, fig. 1, 1879 (Magdalena River); Steindachner, Fisch-fauna des Cauca & Flüsse bei Guayaquil, 11, 1879 (Cauca).

Habitat: Rio Magdalena and its tributaries.

165. Doras albomaculatus.

Doras albomaculatus Peters, MB. Ak. Berl. 470, 1877 (Calabozo).

Habitat: Calabozo, Venezuela.

166. Doras helicophilus.

Doras helicophilus Günther, Proc. Zool. Soc. Lond. xxxvii, 229, 1868 (Surinam).

Habitat: Surinam.

167. Doras dentatus.

Doras dentatus Kner, SB. Ak. Wien, xvii, Ichthyol. Beitr. 118, plate iii, fig. 3, 1855 (Surinam); Günther, Cat. Fish. Brit. Mus. v, 201, 1864 (copied).

Habitat: Surinam.

168. Doras costatus.

Silurus costatus Linnæus, Syst. Nat. ed. xii, 506, 1766.

Cataphractus costatus Bloch, Ausländische Fische, part 8, 82, pl. 376, 1794.

Doras costatus Lacépède, Hist. Nat. Poiss. v, 116, 1803 [in part] (South America); Hancock Zoological Journal, iv, 242, 1828 (Demarara); Cuv. & Val. Hist. Nat. Poiss. xv, 268, 1840 (Guiana); Schomburgk, Fish. Guiana, part i, 156, 1841; Castelnau, Anim. Amerique du Sud. 48, 1855 (Amazon); Günther, Cat. Fish. Brit. Mus. v, 201, 1864 (British Guiana; River Cupai); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 161, 1888 Rio Preto; Rio Puty; San Gonçallo; Xingu Cascade; Obidos; Gurupa; Teffé).

Platydoras costatus Bleeker, Nederl. Tijd. Dierkunde, i, 16, 1863 (name only); id. Silures de Suriname, 38, 1864 (Surinam).

Habitat: Rio San Francisco; Parahyba; Amazon and Solimoens; Guiana region.

The depth under the dorsal spine little less than the width; caudal peduncle about as deep as wide. Head as wide as long, its depth 1⅕ in its length; anterior profile steep; opercles, suborbital, and nasal bones and entire upper portion of the head with radiating series of granules. Dorsal plate with a narrow inward-directed process behind. Anterior portion of the head flat, posterior portion arched. Fontanel wedge-shaped.

Eye large, 1⅓–2⅓ in the snout, 3½–5½ in the head, 1½–2 in the interorbital.

Maxillary barbel reaching second fourth of the pectoral spine; postmentals little beyond base of pectoral, mental about half as long as the postmental barbels.

Snout narrowly rounded, its width at the rictus 2⅓ in the head. Upper jaw projecting. Teeth villiform, in moderate bands.

Breast entirely covered with skin.

First and second hook-bearing lateral scutes touching the dorsal plate above, lower than the third scute which is 1½ in the head; between the scapula and the hook-bearing scutes are two granular plates; the hook-bearing scutes covering the entire sides, leaving a naked dorsal and ventral surface between, the scutes becoming lower backward, conforming to the outline of the body, and not meeting the bases of the adipose and anal fins; the surface of the scutes covered with small ridges, each of which ends in a short marginal spine.

Caudal peduncle entirely covered with plates above and below.

Humeral process reaching to the 2nd or 3rd spine-bearing scute, its surface in the young granular and a series of hooks near its lower margin; finely granular in the old, and having a more or less prominent granular ridge.

Distance of the dorsal fin from the snout 2⅓ in the length; the dorsal spine as long as the head or longer, its outer margin with upturned serræ, its sides deeply grooved, its inner margin with serræ along the central portion. Space between dorsal and adipose fins 5 in the length. Base of the adipose shorter than the dorsal fin.

Caudal emarginate. Anal fin rounded, higher than long, the fifth ray highest, 1½–2 in the head.

Ventrals not reaching the anal 1⅔–1⅘ in the head.

Pectoral spine very strong, reaching beyond base of ventrals, both surfaces striate, both margins strongly serrate. Pectoral pore simple.

Dark brown; a conspicuous light band along the middle of the sides, continued on the caudal fin and meeting in front above the eyes; the brown below the lateral band forms a broad band extending through the eye and meeting in front of the white band; snout and head below this band white; lower surface more or less thickly covered with brown dots; dorsal white at base, a large brown blotch near the tip; marginal and middle caudal rays light, the others dark brown; anal and ventral fins with a dark blotch; pectoral dusky, its spine and inner rays light. Barbels brownish.

Head 3⅔–4; depth 4¾–4½; D. I, 6; A. 11; V. 7; P. I, 7; Lat. l. 28–31.

Twenty-three specimens .10–.37 m. Teffé; Gurupa; Obidos; Xingu Cascade; San Gonçallo; Rio Preto; Rio Puty. Thayer Expedition.

169. Doras armatulus.

Doras armatulus Cuv. & Val. Hist. Nat. Poiss. xv, 275, 1840 (Parana); Kner, SB. Ak. Wien, xvii, 116, 1855 (Guaporé and Paraguay in the Province Matogrosso); Günther, Cat. Fish. Brit. Mus. v, 201, 1864 (copied); Peters, MB. Ak. Berlin, 470, 1877 (Calabozo); Steindachner, Flüssfische Südam, iv, 5, 1883. (Rio Huallaga; Xingu; Rio Puty; Rio Preto).

Habitat: Upper courses of Brazilian Rivers; Venezuela.

Dr. Steindachner considers this to be the young of *costatus*.

170. Doras hancockii.

Doras costata Hancock "Zool. Journ. iv, 242" (not of L.)

Doras hancockii Cuv. & Val. Hist. Nat. Poiss. xv, 279, 1840 (copied); Günther, Cat. Fish. Brit. Mus. v, 202, 1864 (River Cupai.)

Habitat: River Cupai.

171. Doras brachiatus.

Doras brachiatus Cope, Proc. Acad. Nat. Sci. Philad. 270, 1872 (Marañon).

Habitat: Marañon.

172. Doras calderonensis.

Doras calderonensis Vaillant, Bull. Soc. Philom. Ser. 7, iv, 154, 1880 (Calderon).

Doras (*Rhinodoras*) *depressus* Steindachner, Flussfische. Südam. ii, 1, pl. i, figs. 3–3a, 1881 (Lago Alexo).

Habitat: Lago Alexo; Calderon.

The name *calderonensis* has several months priority over *depressus*. This species seems to differ from *D. cataphractus* chiefly in the nature of the serration of the dorsal spine.

173. Doras cataphractus.

Silurus cataphractus Linnæus, Syst. Nat. ed. x, 307, 1758, ed. xii, 506, 1766.

Doras cataphractus Cuv. & Val. Hist. Nat. Poiss. xv, 276, 1840 (?) Schomburgk, Fish. Guiana, part i, 158, 1841 (Rio Negro); Kner, SB. Ak. Wien, xvii, 1855, Ichthyol. Beitr. 126 (Rio Guaporé; Barra do Rio Negro); Bleeker, Ichthyol. Arch. Ind. Siluri. 54, 1858; Günther, Cat. Fish. Brit. Mus. v, 204, 1864 (?)

Acanthodoras cataphractus Bleeker, Nederl. Tijd. Dierkunde, i, 16, 1863; id. Silures de Suriname, 40, 1864 (Surinam).

Cataphractus americanus Bloch & Schneider, "Syst. Ichthyol. 107, pl. 28," 1801; Lacépède, Hist. Nat. Poiss. v, 124 and 127, 1803 (Carolina?).

Doras blochii Cuv. & Val. Hist. Nat. Poiss. xv, 277, 1840 (copied).

?Doras brunnescens Schomburgk, Fish. Guiana, part i, 163, 1841 (Upper Essequibo).

Doras polyramma & polygramma Heckel MS. Kner, l. c. 126 and 127.

Callichthys asper Gronow, "Cat. Fish. ed. Gray, 157, 1854."

Habitat: Central Brazil; Guiana.

174. Doras spinosissimus.

Doras spinosissimus Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. i, 161, 1888 (Coary).

Short and thick, the width below the dorsal spine greater than the depth; caudal peduncle little deeper than wide. Head as broad as long, its depth $1\frac{1}{3}$ in its length; top of head, opercle, preopercle and suborbitals finely granular; the nasal bones with their free margin spinous. Top of head broad and flattish. Dorsal plate broad, without prominent downward or backward processes. Sutures of the skull marked by smooth lines. Fontanel reduced to a small oval opening surrounded by granulations.

Eye $1\frac{3}{4}$ in the snout, 7 in the head, 3 in the interorbital.

Maxillary and postmental barbels reaching to the pectoral pore; mental barbels $\frac{2}{3}$ as long as the postmentals.

Snout broad, its width at the rictus $1\frac{4}{5}$ in the head. Jaws subequal; teeth minutely villiform, the intermaxillary band 6 times as wide as deep.

Gill-opening continued forward to below the upper angle of the preopercle. Humeral process not reaching the tip of the pectoral spine by about an orbital diameter, its surface with short sharp spines, a series of which near the lower margin is enlarged.

Lateral scutes very high, covering almost the entire sides, those above the first anal ray highest, 1⅔ in the head, those on the caudal peduncle meeting the scutes of the other side above and below; each lateral scute posterior to the dorsal plate has a median hook and 5–14 smaller spines above and below it.

Basal half of the caudal rays with about 5 series of small spines.

Distance of the dorsal fin from the snout 2¼ in the length; dorsal spine 1⅖ in the length of the head, its posterior margin smooth, its sides and anterior margin with many short spines, a smooth groove between the spines of the sides and front margin. Distance between dorsal and adipose fins 3½ in the length; adipose fin oval, as long as the dorsal fin without the spine.

Caudal rounded, 2 in the head.

Anal rounded, the central rays highest, as high as the length of the caudal.

Ventrals not reaching the anal, 2 in the head.

Pectoral spine strong, not reaching the ventral fins; its lower surface bluntly granular, its upper with short teeth like those on the humeral process, both margins finely serrate.

Brown marked with white; a white lateral band not as wide as the eye; a median series of white spots on the back; ventral surface and sides of the head irregularly spotted with white; top of the head with a median, interrupted light band; dorsal, pectoral and ventral fins spotted and marbled with brown and white; posterior margin of the adipose white; caudal and anal fins with undulating cross bars of white and brown. Barbels annulated with brown and white.

Head 3⅘; depth 5; Lat. l. 26; D. I, 5; A. 12; V. 6; P. I, 6.

One specimen .15 m. Coary. Professor L. Agassiz.

175. Doras marmoratus.

Doras mamoratus (Reinhardt MS.) Lütken, Dan. Selsk. Skr. 30, 1874 (Rio das Velhas), id. l. c. 1875, pl. i, fig. i; Steindachner, SB. Ak. Wien, lxxi, 147, pl. iv, 1875 (Brazil); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 163, 1888 (Rio San Francisco; Rio das Velhas).

Habitat: Rio San Francisco and its tributaries.

Robust, as deep as wide below the dorsal spine, somewhat compressed behind. Head short and broad, its width about equal to its length; its depth 1⅖ in its length. Dorsal plate greatly enlarged, scarcely narrower than the widest part of the skull, having a backward process which has a downward projection in front. Surface of the bones with vermiculating ridges, which are granular anteriorly and laterally; sutures distinct. Dermal ossification of the scapula not reaching the humeral process. Sides of the head and snout entirely covered with smooth skin. Fontanel scarcely evident externally.

Eye 2¼ in the snout, 7½ in the head, 2¾ in the interorbital. Nasal and suborbital bones concealed beneath the skin.

Maxillary barbels reaching the second fourth of the pectoral spine; mental barbels to somewhat behind the lower angle of the gill-openings, postmentals scarcely beyond base of pectorals.

Snout at the rictus measuring 2⅓–2¼ in length of the head. Upper jaw projecting.

Teeth well developed, setiform; intermaxillary band 6–8 times as wide as deep.

Gill-membranes separate to below the posterior margin of the eye. Breast entirely covered with skin.

First three lateral plates touching the emarginate edge of the process of the dorsal plate, not extending to the humeral process; region between the scapula and first lateral plate naked; the third lateral plate highest, about 2 in the head, the fourth only two-thirds as high as the

3d; all the plates more or less concealed beneath the skin, having a strong median hook, and from none to 2 marginal spines below, and from none to 3 marginal spines above the median hook. Several smooth, well-developed plates above and below on the caudal peduncle; no plates on the back or belly.

Humeral process large, broad, pointed or rounded behind, reaching to below the second lateral plate, its surface with low vermiculating ridges.

Distance of the dorsal fin from the snout 2⅓–2¼ in the length; dorsal spine slightly curved, as long as the head, its sides striate, its anterior margin with upturned serræ, its posterior margin smooth, with a median groove. Space between the dorsal and adipose fins little greater than the base of the latter, which is considerably longer than the dorsal fin.

Caudal fin emarginate.

Anal fin higher than long, its margin rounded.

Ventrals, 1¾–2 in the head.

Pectoral spine broad, strong and long, reaching the ventrals or a little shorter; upper and lower surfaces of the spine finely striate, both margins strongly serrate.

Pectoral pore large, simple.

Sides and back and the fins covered with minute dark dots.

Head $4\frac{2}{7}$–4⅓; depth 4½–5⅖; D. I, 6; A. 11; V. 6; P. I, 8; Lat. l. 30–31.

Two specimens, .27 m. Rio San Francisco; Rio das Velhas. Allen & St. John.

176. Doras affinis.

Doras affinis Kner, SB. Ak. Wien, xvii, 1855, 121, pl. ii, fig. 1 (Rio Branco; Guaporé); Günther, Cat. Fish. Brit. Mus. v, 202, 1864 (copied).

Amblydoras affinis Bleeker, Nederl, Tijdschr. Dierk. i, 17, 1863 (name only).

Doras truncatus Bleeker, l. c. 18.

Habitat: Rio Branco and Rio Guaporé.

177. Doras weddellii.

Doras weddellii Castelnau, Anim. Amér Sud. 48, pl. xvii, fig. 1, 1855 (Chiquitos); Günther, Cat. Fish. Brit. Mus. v, 203, 1864 (Santarem); Vaillant, Bull. Soc. Philom, Ser. 7, iv, 154, 1880 (Calderon); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 163, 1888 (Fonteboa Teffé; Serpa; Porto do Moz; Silva, L. Saraca).

Doras grypus Cope, Proc. Acad. Nat. Sci. Philad. 1872, 270, pl. xv, fig. 1–1*a* (Ambyiacu River).

Habitat: Amazon and its tributaries, most abundant westward.

The original figure and description of *weddellii* are very poor. Our specimens are lighter colored than the figure by Prof. Cope; the whitish blotches below the lateral line being continued up and meeting on the back.

Depth below the dorsal spine less than the width, tapering backward. Head short, its width equal to its length, its depth 1⅓ in its length. Bones of the head rather finely granular, with large, depressed smooth areas. Dorsal plate with a downward projecting branch. Fontanel elliptical, as long as the eye, its posterior margin extending farther back than the eye, becoming surrounded with granular bones in older specimens. Nasal and suborbital bones covered with skin, the former becoming exposed and granular in the old.

Interorbital area flat. Eye small, 1¾–1½ in the snout, about 7 in the head; 2½ in the interorbital.

Maxillary barbels extending beyond base of pectorals, postmentals about as long as the maxillaries, mental barbels somewhat shorter. Snout broad, its width at the rictus about 2 in the head: in the young its upper surface is covered with skin, two series of conspicuous pores; in the old some of the bones become more or less granular and exposed, the pores less distinct. Mouth terminal; jaws equal; teeth in very shallow bands.

Gill-opening continued forward below to a point midway between posterior margin of eye and the upper angle of the preopercle.

First three lateral scutes higher than the rest, touching the dorsal plate above, the region anterior to them smooth; the lateral scutes low, almost concealed by the skin, with strong median hooks and sometimes with one or two marginal spines above and below. Accessory rays of the caudal fin greatly enlarged, plate-like. No scutes on back or belly.

Humeral process narrow and long, reaching the 2d or 3d lateral scute, having a single series of hooks in the young, granular in the old, with series of larger granules.

Distance of the dorsal fin from the snout 2½ in the length; dorsal spine an orbital diameter shorter than the head, its posterior margin with a median groove, its sides striate, its anterior margin smooth. Distance between dorsal and adipose fins about equal to the length of the head; the base of the adipose somewhat shorter than the dorsal fin.

Caudal fin emarginate.

Anal higher than long, the 4th or 5th ray highest.

Ventral fins almost or quite reaching the anal.

Pectoral spine very large and long, reaching beyond base of ventral fins, both surfaces finely striate, both margins strongly serrate. Pectoral pore simple, situated above the last pectoral ray.

Coracoid process striate, more or less exposed.

Color brown, conspicuously marked with darker and lighter; dorsal surface chocolate; a darker area at base of dorsal fin, extending somewhat behind it as an irregular bar; a similar spot at base of adipose extending forward below; lateral line nearly white; a dark spot behind the humeral process, continuing backward through the lower caudal lobe as a band which is somewhat interrupted on the sides, the dark color of the back likewise extending as a band through the upper caudal lobe; two dark, somewhat obscure bands extending from occiput to snout, a broader curved band connecting the anterior and posterior nostrils; sides of head spotted with dark brown, a bar of that color running immediately below the margin of the buckler of the head continued forward in front of the eye to base of maxillary barbels. All the barbels annulated with dark and light brown. Ventral surface nearly white, dotted with brown. Fins spotted or lengthwise striped with brown.

Head $3\frac{4}{5}$–$3\frac{1}{2}$; depth $4\frac{1}{2}$–5; D. I, 6; A. 13; V. 7; P. I, 7.

Twenty-eight specimens .065–.22 m. Fonteboa; Teffé; Serpa; Porto do Moz; Silva, Lake Saraca. Agassiz; Thayer; Senhor Vinhas.

178. Doras crocodili.

Doras crocodili Humboldt, Observ. Zool. ii, 184, pl. 48, fig. 2 (Rio Magdalena); Cuv. & Val. Hist. Nat. Poiss. xv, 287, 1840.

Centrochir crocodili Agassiz, Gen. et Spec. Pisc. Bras. 14, 1829; Bleeker, Nederl. Tijdschr. Dierkunde, i, 14, 1863 (name only).

Habitat: Rio Magdalena.

This species is known only from Humboldt's account and figure. It is most likely identical with *Doras longipinis* St., the only authoritatively known species of the Rio Magdalena.

179. Doras castaneo-ventris.

Doras castaneo-ventris Schomburgk, Fish. Brit. Guiana, part i, 161, pl. iii, 1841 (Rio Pasawiri).

Habitat: Rio Pasawiri.

This species is known only from the description and fantastic figure by Schomburgk.

180. Doras pectinifrons.

Doras pectinifrons Cope, Proc. Am. Philos. Soc. xi, 568, 1870 (Pebas, Ecuador); id. Proc. Acad. Nat. Sci. Phila. 1872, pl. 3.

Agamyxis pectinifrons Cope, Proc. Am. Philos. Soc. xvii, 679, 1878 (nov. gen.)

Habitat: Eastern Ecuador.

181. Doras asterifrons.

Doras asterifrons Heckel, MS. in Kner, SB. Ak. Wien, xvii, 1855. Ichthyol. Beitr. 123, plate ii, fig. 2 (Barra do Rio Negro, Rio Guaporé); Günther, Cat. Fish. Brit. Mus. v, 203, 1864, (River Cupai); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 163, 1888 (Jutahy; Teffé; Porto do Moz; Serpa).

Astrodoras asterifrons Bleeker, Nederl. Tijd. Dierkunde, i, 1863 (name only).

Habitat: Amazon, Solimoens and tributaries.

Wide and depressed in front, the depth below the dorsal spine scarcely more than half its width; the depth at the caudal peduncle equal to its width. Breast very wide, the width between the outer margins of the clavicles equal to the distance from the snout to the dorsal spine. Head short and pointed, its width equal to its length; its depth 1¼ in its length. Bones of the head with series of fine granules; dorsal plate ending in a sharp process on either side behind the dorsal spine. Posterior portion of the head with a strong median keel. Supercilliary ridges raised, the interorbital area deeply concave; suborbital bones and preopercle granular; nasal bones forming a high crest which is deeply pectinate. Fontanel extending scarcely beyond the middle of the eye, continued as a groove along the median keel.

Eye well protected, 1⅓–2¾ in the snout, 4–5 in the head, 1⅔–2 in the interorbital.

Maxillary barbels reaching beyond the middle of the pectoral spine; mental barbels little more than half as long as the postmental which reach somewhat beyond the base of the pectoral spine.

Snout narrow, its width at the rictus 2–2½ in the head; jaws equal, or the upper little longer; teeth in narrow bands.

Gill-opening extending forward to below the eye; coracoid bones exposed below, striate in front, the points of the processes sharply granular.

Two small granular plates on the humeral region; the first and second hook-bearing lateral scutes touch the dorsal plate, the fifth lateral plate highest, 1¾ in the head, gradually decreasing in height backward, but leaving only a narrow naked area on the back. Each scute with one or two marginal spines below and three or four above the median hook. Caudal peduncle with a single plate above and another below; back and belly naked.

Humeral process greatly swollen in front, tapering, reaching to the first or second median scute; its surface sharply granular, with a series of recurved hooks near its lower margin.

Distance of the dorsal spine from the snout 2⅖–2½ in the length. Dorsal spine straight, about as high as its distance from the anterior margin of the eye; its posterior margin smooth, its sides each with two high ridges, its anterior margin with upturned serræ. Distance of the adipose fin from the dorsal fin 3⅗–4½ in the length, its base shorter than that of the dorsal fin.

Caudal scarcely emarginate. Anal rounded, the middle rays highest, 1½ in the head.

Ventrals not reaching the anal.

Pectoral spine reaching past base of ventrals, its sides striate, its margins serrate. Pectoral pore inconspicuous, simple.

Sides and back marbled with dark and light brown; ventral surface dusky, all the fins with bars or round dark spots.

Head 4; depth about 5; D. I, 6; A. 11–12; V. 7; P. I, 7; Lat. l. 24–25.

Ten specimens .05–.11 m. long. Jutahy; Teffé; Porto do Moz; Serpa. Prof. Agassiz; Thayer; Senhor Vinhas.

182. Doras heckelii.

Doras heckelii Kner, SB. Ak. Wien, xvii, 125, fig. 4, 1855 (Rio Negro); Günther, Cat. Fish. Brit. Mus. v, 204, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 163, 1888 (Jutahy; Tonantins; Teffé; Tabatinga).

Habitat: Solimoens.

Body heavy forward tapering to a slender caudal peduncle; the depth below the dorsal spine ¾ of the width; the depth at the caudal peduncle greater than the width. Head short, depressed and pointed; its width little less than its length; its depth 1⅖ in its length. Bones of the head coarsely striate becoming granular only on the outer margins of the buckler. Dorsal plate with a backward process which has an inward projecting knob behind, the outer margin of which is serrate; scapular processes on the sides extending down to the humeral process. Superciliary margins slightly raised, serrate in front of the eye; a deeply pectinate nasal shield articulates with the somewhat granular or serrate suborbital bones; fontanel elongate triangular, the posterior wider end not even with the posterior margin of the orbit.

Eye well protected, 1½ in the snout, 5 in the head, 1⅓–1½ in the interorbital.

Maxillary barbels reaching past the middle of the pectoral spine; mental barbels not to the base, postmentals to the second third of the pectoral spine.

Snout narrow, its width at the rictus 2–2½ in the head, its length less than its width. Upper jaw projects. Teeth well developed, in moderate bands.

Gill-membranes separate to below the middle between the eye and preopercle; processes of the corocoids naked below, their surfaces striate; otherwise the breast is covered with skin.

First two lateral plates touching the process of the dorsal plate above but not extending to the humeral process below; the region in front of the first lateral plate with two elongate dermal ossifications corresponding to the hooks of the lateral plates. The highest plate, exclusive of the first two, about two diameters of the eye high; each with a compressed median hook and from none to two smaller spines below and from one to six above the median hook. No plates on dorsal or ventral surfaces.

Humeral process very long and narrow, tapering backwards and reaching the last third of the pectoral spine; its surface with series of sharp granules and a series of larger hooks near its lower margin which are reduced to a pectinate ridge in the adult.

Distance of the dorsal spine from the snout 2½ in the length; dorsal spine longer than the head, its sides deeply furrowed, its anterior margin with upturned serræ, its posterior margin broad, smooth, having a median groove. First dorsal ray higher than the spine, nearly reaching the adipose fin. Distance of the adipose fin from the dorsal fin 3⅔–4⅔ in the length, its base about as long as that of the dorsal fin.

Caudal fin emarginate, having conspicuous accessory rays.

Anal fin higher than long, rounded; its middle rays 1½ in the head. Ventrals about as high as the anal.

Pectoral spine long and curved, reaching to the vent, little beyond the base of the ventrals in the adult; its upper surface coarsely its lower surface finely striate, both margins with strong teeth. Pectoral pore simple, above the base of the pectoral.

Sides and back chocolate, dotted and spotted with darker. Lower surface white, belly densely and other portions more sparsely covered with brown dots. Fins all more or less spotted with brown.

Head 4–4⅓; depth 4½–5½; D. I, 6; A. 11 or 12; V. 7; P. I, 7; Lat. l. 29–30.

One specimen .16 m. Jutahy. James, Thayer & Talisman. Two specimens .11–.13 m. Tonantins. Thayer & Bourget. Twelve specimens .05–.18 m. Teffé. Prof. Agassiz. Two specimens. Tabatinga. Bourget.

183. Doras monitor.

Zathorax monitor Cope, Proc. Acad. Nat. Sci. Phila. 1872, 271, pl. 4, fig. 1 (Amazon).

Habitat: Amazon.

This species is known only from the types.

184. Doras nauticus.

Zathorax nauticus Cope, Proc. Acad. Nat. Sci. Phila. 1874, 133 (Nauta); id. Proc. Am. Philos. Soc. xvii, 678, 1878 (Nauta).

Habitat: Marañon.

This species is known only from the types.

XLI. OXYDORAS.

Oxydoras Kner, SB. Ak. Wien, xvii, 115, 1855 (sp.)

Oxydoras Bleeker, Nederl. Tijdschr. Dierk. i, 14, 1863 (*niger*).

Pseudodoras Bleeker, Nederl. Tijdschr. Dierk. i, 14, 1863 (d'Orbigny).

Rhinodoras Günther, v, 209 (sp.)

Type: *Doras niger* Valenciennes.

Dr. Bleeker departs from his usual rule of considering the first species the type of the genus, and establishes *niger* as the type of *Oxydoras*. As this is the first restriction of *Oxydoras* to any type it should be adopted.

This genus is most readily distinguished from *Doras* by the posterior position of the eyes. Maxillary barbels simple. Snout long and pointed. Adipose fin long and low, gradually merging into the dorsal outline anteriorly. Dorsal spine serrate on both margins. Sides with a series of hook-bearing plates.

Habitat: Rio Plata; Amazon and Guiana region.

ANALYSIS OF THE SPECIES OF OXYDORAS.

a. Teeth none; posterior nostril nearer the anterior nostril than to the eye; anterior nostril remote from tip of snout; eye situated wholly in the posterior half of the head; dorsal spine with much stronger teeth in front than behind; gill-openings continued below to a point directly behind the rictus; head much longer than broad. (OXYDORAS.)

b. Lateral scutes 17-25. *niger* 185.

bb. Lateral scutes 34. *knerii* 186.

aa. Teeth present; posterior nostril nearer the eye than to the anterior nostril which is close behind the lip; eye equidistant between tip of snout and posterior margin of opercle, or slightly nearer the latter; dorsal spine with much weaker teeth in front than behind; gill-openings not continued below the pectoral spine; head about as long as broad. D. I, 6; A, 12. (RHINODORAS.)

c. Lateral scutes 29; dorsal and ventral surfaces of the caudal peduncle shielded; humeral process extending to the last fourth of the pectoral spine; maxillary barbels not reaching the gill-opening; Dorsal and caudal fins with dark spots. (Kner.) *d'orbigny* 187.

cc. Lateral scutes 40; dorsal and ventral surfaces of the caudal peduncle naked; humeral process extending little beyond middle of pectoral spine; maxillary barbels reaching considerably beyond base of pectoral spine. (Steindachner.) *amazonum* 188.

185. Oxydoras niger.

Doras niger Val. in Humb. Observ. Zool. ii, 184; Cuvier & Valenciennes xv, 291, 1840 (?); Schomburgk, Fish. Guiana, part i, 165, 1841; Müller & Troschel, Schomburgk, Brit. Guiana, 629, 1848 (Rivers of Guiana); Bleeker, Nederl. Tijd. Dierkunde, i, 14, 1863 (name only).

Rhinodoras niger Günther, Cat. Fish. Brit. Mus. v, 209, 1864 (Amazons); Cope, Proc. Am. Philos. Soc. xvii, 678, 1873 (Nauta); Vaillant, Bull. Soc. Philom. Ser. 7, iv, 1880 (Calderon).

Oxydoras niger Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 159, 1888 (Teffé; Gurupa; Manacapuru; Coary; Obidos).

Doras humboldti Agassiz, Gen. et Spec. Pisc. Bras. 14, 1829 (Rio San Francisco, Brazil); Agassiz, A Journey in Brazil, 1868.

Corydoras edentatus Spix, Gen. et Spec. Pisc. Bras. pl. v, 1829.

Rhinodoras prionomus Cope, Proc. Acad. Nat. Sci. Philad. 1874, 134 (Nauta); id., Proc. Am. Philos. Soc. xvii, 678, 1878 (Nauta)

Rhinodoras teffeanus Steindachner, SB. Ak. Wien, lxxi, 145, pl. iii, 1875 (Teffé).

Habitat: Amazon and northward; Rio San Francisco?

We have examined two specimens from Teffé agreeing in all particulars with the plate of *D. teffeanus* Steindachner; the first spine-bearing lateral plate is partially concealed under the skin, but touches the dorsal plate above as in the typical *niger*. As we cannot consider the marbled color (traces of which are also seen in some of our larger specimens), of specific value, we have identified it with *niger*. *Ox. teffeanus* was identified by Dr. Cope with his *prionomus*—it is therefore also placed in the synonymy of *niger*. The remaining synonymy needs no explanation.

Elongate, slender; depth beneath the dorsal spine about equal to the width; caudal peduncle depressed. Head long and pointed, its width about equal to its depth, 1½ in its length. Top of the head granular-striate, the obtuse keel of the posterior part of the head simply striate. Opercle with radiating ridges, granular on its upper portion. Dorsal plate continued beyond the dorsal spine, with a broad descending process behind. Interorbital region nearly flat; profile almost straight and moderately steep. Fontanel narrow, not extending beyond the middle of the eye, but continued backward as a groove.

Eye considerably behind the middle of the head; 4½–5⅔ in the snout, 8½–9⅓ in the head, 3–3⅓ in interorbital.

Barbels thick at base, thickly papillose; maxillary barbels extending to the posterior margin of the eye; mentals half as long as the postmentals which are a little shorter than the maxillaries.

Snout long and pointed, covered with smooth skin, its width at the rictus 3½–3 in the head. Lips thick, the lower one thickly papillose. Distance of the anterior nares from the tip of the snout much greater than from the posterior nares. Teeth none.

Gill-opening extending to below the posterior angle of the preopercle. Breast entirely covered with skin.

Lateral scutes low, those between the ventrals and anal highest. Each scute with a strong median hook; the posterior half of the surface above and below covered with numerous short spines. Three small imbedded plates in the humeral region. No plates on dorsal or ventral surface. Snout with numerous small pores; a few conspicuous canals on humeral region and below and between the eyes. Sides and back covered with minute circular or oval warts (in the adult).

Humeral process extending to the posterior third of the pectoral spine; its surface sharply granular; a median ridge with a single series of spines in the young. Pectoral pore simple.

Distance of the dorsal spine from the snout $2\frac{1}{3}$–2^{5} in the length. Dorsal spine somewhat curved, $1\frac{1}{2}$–$1\frac{2}{7}$ in the head, its sides finely striate, serrate in front and behind, the anterior serræ strongest. Back somewhat trenchant, with a long, low, adipose fin.

Caudal emarginate, the lobes rounded, the rays leathery, about $1\frac{3}{4}$–2 in the head.

Anal truncate, fifth ray highest, 2–$2\frac{2}{5}$ in the head.

Ventrals long, not reaching the anal, about as high as the anal.

Pectoral spine strong, finely striate on both sides, serrate on both margins, reaching beyond the vertical from the last dorsal ray.

Brown; sometimes white below, the little warts on the back and sides white. Sides and belly sometimes with darker spots. Fins dark brown, sometimes spotted at the base. Young light brown, spotted with darker.

Head 3–$3\frac{1}{3}$; depth 5; Lat. l. 17–25; D. I, 6; A. 11–12; V. 7; P. I, 10.

Sixteen specimens .135–.44 m. Teffé *(prionomus)*; Gurupa; Manacapuru; Coary; Obidos.

186. Oxydoras knerii.

Doras (Oxydoras) niger Kner, SB. Ak. Wien, xvii, 1855, 146, not Val. (Cujaba),

Oxydoras knerii Bleeker, Nederl. Tijdschr. Dierkunde, i, 12 and 14, 1863 (name only).

Rhinodoras knerii Günther, Cat. Fish. Brit. Mus. v, 209, 1864 (copied).

Habitat: Cujaba.

187. Oxydoras d'orbigny.

Doras (Oxydoras) d'orbigny (Kröyer), Kner, SB. Ak. Wien, xvii, 149, pl. v. fig. 9, 1855 (Rio Plata).

Oxydoras d'orbigny Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 159, 1888.

Doras d'orbignii Hyrtle, Denk. Ak. Wien, xvi, 17, 1859 (vertebræ 6+4+21).

Rhinodoras orbignyi Bleeker, Nederl. Tijdschr. Dierkunde, i, 14, 1863 (name only); Günther, Cat. Fish. Brit. Mus. v, 209, 1864 (copied).

Habitat: Rio de la Plata.

188. Oxydoras amazonum.

Rhinodoras amazonum Steindachner, SB. Ak. Wien, lxxi, 141, pl. ii, 1875 (Amazon near Teffé).

Oxydoras amazonum Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 159, 1888.

Habitat: Teffé.

XLII. HEMIDORAS.

Doras Lacépède, Hist. Nat. Poiss. v, 116, 1803 (*carinatus* and *costatus*).

Doras Bleeker, Nederl. Tijdschr. Dierkunde, i, 13, 1863 (*carinatus;* not *Doras* Cuv. & Val.)

Oxydoras Kner, SB. Ak. Wien, xvii, 1855. (sp.)

Hemidoras Bleeker, Ichthyol. Arch. Indici. Siluri, 1858 (*stenopeltis*).

Hassar Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888.

Type: *Doras stenopeltis* Kner.

The genera *Hemidoras*, *Oxydoras*, and *Doras*, as understood in this paper, correspond to and are respectively coextensive with the genera *Oxydoras*, *Rhinodoras*, and *Doras* of Dr. Günther.

Maxillary barbels and sometimes the mental barbels with a series of short tentacles; mental barbels and sometimes all the barbels connected by a broad membrane. Snout usually naked. Sides with a series of hook-bearing plates.

Habitat: Paranahyba; Amazon and its tributaries; Guiana.

The deeper forms of this genus resemble very closely the species of the genus *Centromochlus*, and those other genera in which the dorsal plate has a descending process behind. These forms usually have a movable subdermal bone or cartilage descending from the dorsal plate, which is represented in the mailed forms by the first lateral plate.

ANALYSIS OF THE SPECIES OF HEMIDORAS.

a. Lateral scutes well developed from the dorsal plate backward.

b. Fontanel not continued as a groove to tip of occipital process.

c. Snout short, rounded.

d. Vertical diameter of eye little less than the longitudinal diameter.

e. Upper jaw without teeth.

f. Dorsal spine shorter than the pectoral spine, not reaching origin of adipose fin. Adipose shorter than anal fin; pectoral pore large. Snout (except the area between the anterior and posterior nares), preorbitals and preopercle, granular. *nattereri* 189.

ff. Dorsal spine as high as the pectoral spine. Snout, to the posterior nostrils and cheeks, covered with skin. Humeral process reaching to the first lateral plate. Adipose fin about as long as the anal fin. Pectoral pore wanting. D. I, 6; P. I, 7; V. 7; A. 13–14; Lat. l. 29–30. (Kner.) *brevis* 190.

ee. Teeth in both jaws; snout and cheeks naked. Humeral process ending in front of the first lateral plate.

g. Caudal peduncle with a single large plate on its upper and lower surfaces; coracoid process turned up, meeting the first lateral scute. Maxillary barbels not reaching beyond base of pectorals. Pectoral spine as long as the dorsal spine, reaching beyond base of ventral fins. Brown, with blackish spots and points. D. I, 6; P. I, 8; V. 7; A. 11; Lat. l. 29–30. (Kner.) *fimbriatus* 191.

gg. Caudal peduncle naked above and below; coracoid process straight; first lateral plates not enlarged. Dorsal spine shorter than the pectoral spine which does not reach the base of the ventrals. Maxillary barbels not reaching to the gill-opening. Sides and back brownish, with darker spots. D. I, 6; P. I, 7; V. 7; A. 13; Lat. l. 29–30. (Kner.) *punctatus* 192.

dd. Vertical diameter of the orbit half the longitudinal diameter; dorsal spine longer than the pectoral spine; both spines serrate on both margins. Snout pointed, compressed, strongly decurved in front of the eyes; longitudinal diameter of the eye 2½ in the head; its vertical diameter 2 in the snout, 1 in the interocular, 5½ in the head. Snout, interorbital, cheeks and most of the head naked. Fontanel almost as wide as the interorbital, extending behind the eyes; anterior nares nearer to the eye than to the snout. No teeth on the intermaxillaries. Maxillary barbels reaching to the gill-opening. Humeral process twice as long as high. Lateral plates small, largest on the caudal peduncle, which does not bear shields on its upper and lower surfaces. Brownish, ventral surface whitish. Depth 5; D. I, 6; P. I, 9; V. I, 6; A. 12; Lat. l. 37–38. (Kner.) *lipophthalmus* 193.

cc. Snout long, slender, triangular. Body much elongate. Teeth in the jaws none. Barbels united by a broad thin membrane; maxillary barbel longest, reaching nearly to the base of the pectoral, with several accessory barblets. Outer mandibulary barbel split to near its base. Eye 2½ in the snout, 5 in the head. Lateral shields high, covering two-thirds of the side of the body, with a marginal series of spines. Humeral process scarcely longer than high. Dorsal spine shorter than the head, slightly serrate along both edges. Head 4; depth 7–8; D. I, 6; A. 16; P. I, 10; V. 7; Lat. l. 42. (Günther.) *acipenserinus* 194.

bb. Fontanel continued as a groove to tip of dorsal plate.

h. Back, between the dorsal and adipose fins, and sometimes the belly between the ventrals and the anal, with a series of plates. *stenopeltis* 195.

hh. Back, between the dorsal and adipose fins, naked.

i. No teeth in the jaws; maxillary barbel reaching to edge of opercle. Head compressed, snout conical, elongate. Eye 4⅗–5 in the head. Snout in front of the nostrils, and the sides of the head, naked. Humeral process about twice as long as high, ending in a point somewhat behind the middle of the pectoral spine. Pectoral spine reaching a little beyond the base of the ventrals. Lateral plates low. Head 3–3⅛; depth 5⅓–5¼; D. I, 6; A. 11; Lat. l. 3 + 29–30. (Steindachner.) *stübelii* 196.

ii. Minute groups of teeth in one or both jaws.

j. Maxillary barbel reaching beyond the head; head long, compressed, with a long narrow snout, somewhat roof-shaped in the nuchal region. Lateral scutes serrate on their posterior margins. Anterior nostril midway between tip of snout and eye. Intermaxillaries each with a minute patch of teeth; somewhat larger patches in the lower jaw. Snout and cheeks covered with skin. Humeral process extending beyond the middle of the pectoral spine. Pectoral pore large. Dorsal and pectoral spines equal in length, serrate on both margins; the pectoral extends beyond the base of the ventral fins. Head 3¼; depth 5; D. I, 6; A. 14; P. I, 9; V. 7; Lat. l. 34. (Steindachner.) *morei* 197.

jj. Maxillary barbel extending to below the eye; bases of all the barbels united. D. I, 6; A. 12–13; P. I, 8–9; V. 7. Lat. l. 32–35.

k. Upper and lower profile of the snout equally oblique. (Kner.) *humeralis* 198.

kk. Snout elongate, pointed; lower profile straight, the upper descending. *carinatus* 199.

aa. Shields on the anterior half of the body rudimentary or none; a subdermal stay connects the dorsal plate with the tip of the humeral process, a similar one connects the tip of the dorsal plate with the post temporal, to which the stay is firmly joined. Snout very long and pointed; head compressed; lower profile straight, upper profile strongly arched. Humeral process broad, rounded behind. Numerous pores in the axil, giving a sieve-like appearance. (HASSAR.)

l. A conspicuous black spot on the dorsal fin composed of small dots; scapula covered with skin. *orestes* 200.

ll. Dorsal dusky at tip, without a black spot; scapula granular. *affinis* 201.

189. Hemidoras nattereri.

Oxydoras nattereri Steindachner, Flussfische Südamerika's, ii, 4, pl. 2, figs. 1–1*a*, 1881 (Teffé, Amazons).

Hemidoras nattereri Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888 (Coary; Jutahy; Teffé).

Habitat: Solimoens.

Body short and deep, compressed, the ventral outline almost straight, dorsal outline strongly arched, highest in front of the dorsal spine. Head short, somewhat deeper than wide, its depth being about equal to its length: the opercle, preopercles, suborbitals, prenasals and entire upper surface of the head striate, becoming reticulate posteriorly. In the adult the snout is entirely covered with ossifications except a curved oblong area connecting the anterior and posterior nares. Interorbital region flattish, occipital region steeply roof-shaped. Fontanel an oval opening somewhat shorter than the eye, situated in a groove about as long as the eye, entirely surrounded by dermal ossifications.

Eye large, 1–$1\frac{1}{3}$ in the snout, $2\frac{3}{4}$–3 in the head, $\frac{8}{9}$–1 in the interorbital.

Barbels all connected by a membrane; those of the maxillaries extending to below the eye, with a few cirri on the outer margin; a 5th and 6th barbel arise on either side of the symphysis and extend outward to the edge of the membrane.

Gill-opening extending forward to below the eye.

Coracoid process exposed, striate. Humeral process broad and long, reaching to below the 2nd or 3d dorsal ray, its surface granular, obliquely truncate behind. A few imbedded plates in front of a large scute which connects the humeral process and dorsal plate, the following lateral scutes much lower, each with a large median hook, and a series of fine marginal teeth above and a series of one large and several fine teeth below the median hook; the lateral scutes on the caudal peduncle have a more enlarged median hook, and the fine marginal teeth fewer or none. No plates on dorsal or ventral surfaces.

Distance of the dorsal spine from the snout 2¼–2⅗ in the length; dorsal spine slightly curved, its sides rather deeply grooved, its anterior margin with rather long and fine teeth to near the tip, its posterior margin with short wide-set teeth. Space between dorsal and adipose fins 3½–4 in the length; adipose fin as high as long, half as long as the dorsal fin.

Caudal deeply emarginate, upper lobe longer, 3½ in the length. Anal fin about as high as long, rounded.

Ventrals short, not reaching to the anal.

Pectoral spine strong, longer than the dorsal spine, reaching beyond base of ventral fins; both margins serrate, both surfaces striate. In a specimen .05 m. long the pectoral spine is as long as the dorsal spine, and does not reach to the base of the ventrals.

Light brown above, silvery below the lateral scutes; tip of dorsal, anterior half of anal and the pectoral fins sometimes dotted with dark.

Head 3⅗–3¾; depth 3½; lat. l. 30–31+2 or 3; D. I, 6; A. 12; V. 7; P. I, 8.

Six specimens .05–.13 m. Tabatinga; Jutahy; Coary; Teffé. Agassiz, James, Thayer and Talisman.

190. Hemidoras brevis.

Doras brevis Kner, SB. Ak. Wien, xvii, 138, pl. vi, fig. 11, 1855 (Barra do Rio Negro).

Corydoras brevis Heckel MS. Kner, l. c.

Oxydoras brevis Günther, Cat. Fish. Brit. Mus. v, 207, 1864 (copied); Vaillant, Bull. Soc. Philom. Ser. 7, iv, 154, 1880 (Calderon).

Hemidoras brevis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888.
Habitat: Solimoens and Marañon.

191. Hemidoras fimbriatus.
Doras fimbriatus Kner, SB. Ak. Wien, xvii, 134, 1855 (Rio Guaporé).
Oxydoras fimbriatus Günther, Cat. Fish. Brit. Mus. v, 207, 1864 (copied).
Hemidoras fimbriatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888.
Corydoras loricatus Heckel MS. Kner, l. c.
Habitat: Rio Guaporé.

192. Hemidoras punctatus.
Doras punctatus Kner, SB. Ak. Wien, xvii, 136, plate vi, fig. 10, 1855 (Matogrosso, Rio Guaporė).
Corydoras punctatus Hyrtle, Denk. Ak. Wien, xvi, 17, 1859 (vertebræ 5+1+21).
Oxydoras punctatus Günther, Cat. Fish. Brit. Mus. v, 207, 1864 (copied).
Hemidoras punctatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888.
Habitat: Rio Guaporé.

193. Hemidoras lipophthalmus.
Doras (Oxydoras) lipophthalmus Kner, SB. Ak. Wien, xvii, 147, pl. v, fig. 8, 1855 (Rio Negro).
Oxydoras lipophthalmus Günther, Cat. Fish. Brit. Mus. v, 208, 1864 (River Capin).
Hemidoras lipophthalmus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888.
Corydoras ophthalmus Heckel MS. Kner, l. c.
Habitat: Amazon and its tributaries.

194. Hemidoras acipenserinus.
Oxydoras acipenserinus Günther, Proc. Zool. Soc. London, 1868, 230, pl. xx (Xeberos); Steindachner, Flussfische Südamerika's, ii, 8, 1881 (Xeberos).
Hemidoras acipenserinus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888.
Habitat: Xeberos.

195. Hemidoras stenopeltis.
Doras (Oxydoras) stenopeltis Kner, SB. Ak. Wien, xvii, 142, pl. iv, fig. 7, 1855 (Rio Negro).
Oxydoras stenopeltis Günther, Cat. Fish. Brit. Mus. v, 208, 1864 (Copied).
Corydoras stenopeltis Heckel, MS. Kner, l. c.

Hemidoras stenopeltis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888 (Rio Negro; Manaos; Hyavary; Manacapuru; Teffé; Tabatinga; Obidos).

Habitat: Amazon, Solimoens.

Elongate, slender, little compressed. Head long, slender, pointed; interorbital area flattish, occipital region convex in transverse profile; opercle, suborbital and bones of the crown granular. Fontanel a simple opening, somewhat shorter than the eye, continued forward as a broad groove, and backward as a groove to the tip of the dorsal plate; two small, oval foramina on either side of the suture between the occipital process and dorsal plate. Dorsal plate much broader than the interorbital width.

Eye 1½–2 in snout, 3½–4⅖ in the head, ¾–1 in the interorbital; snout long and pointed; width at the rictus about equal to the eye; intermaxillaries and dentaries each with a small patch of villiform teeth.

Maxillary barbel extending beyond base of pectoral spine, with a series of about 16 short filaments on its outer margin; mental barbels short, with very short filaments, all the barbels connected by membranes.

Gill-openings extending forward to below eyes.

Two or three large flat plates in front of a lateral scute which connects the humeral process and dorsal plate; the lateral scutes following are very narrow and high and obliquely placed, the highest one 2 in the head; each scute with a series of fine marginal spines above and below the median hook; a series of flat plates between the dorsal and adipose fins and between the vent and the anal fin. In the young the plates are less developed and more or less concealed.

Humeral process extending to below the dorsal spine or second dorsal ray. Pectoral pore simple, large.

Distance of the dorsal spine from the snout 2¼–2⅖ in the length; dorsal spine slightly curved, little higher than the length of the head, its sides grooved, the lower half of the anterior margin with fine teeth, the entire posterior margin with larger teeth. Space between dorsal and adipose fins 4 in the length; the adipose fin longer than high, shorter than the dorsal fin.

Caudal fin deeply forked, the lobes about as long as the head. Anal fin emarginate, the anterior rays highest.

Ventral fins not reaching the anal.

Pectoral fin reaching to base of ventrals or slightly farther, little longer than the dorsal spine.

Light brown above, silvery on sides and below; fulcrum of the dorsal spine blackish; tips of the first dorsal rays dusky; sometimes the middle caudal rays, sometimes a narrow bar on each lobe of the caudal, sometimes the anterior half of the ventrals dusky.

Head $3\frac{3}{5}$–$3\frac{4}{5}$; depth $5\frac{1}{3}$; lat. l. 34+3; D. I, 6; A. 13; V. 7, P. I, 9.

Fifteen specimens .065–.16 m. Manaos; Rio Negro; Hyavary; Manacapuru; Teffé; Obidos; Tabatinga. Thayer Expedition.

196. Hemidoras stübelii.

Oxydoras stübelii Steindachner, Flussfische Südamerika's, iv, 5, pl. iii, figs. 1-1*b*, 1882 (Rio Huallaga).

Hemidoras stübelii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888,

Habitat: Huallaga.

197. Hemidoras morei.

Oxydoras morei Steindachner, l. c. ii, 6, pl. i, figs. 2-2*a*, 1881 (Rio Negro).

Hemidoras morei Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888.

Habitat: Rio Negro.

198. Hemidoras humeralis.

Doras humeralis Kner, SB. Ak. Wien, xvii, 1855, 140, pl. iv, fig. 6 (Barra do Rio Negro).

Corydoras humeralis Heckel MS. Kner, l. c.

Oxydoras humeralis Günther, Cat. Fish. Brit. Mus. v, 206, 1864 (copied).

Hemidoras humeralis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888.
Habitat: Rio Negro.

199. Hemidoras carinatus.

Silurus carinatus Linnæus, Syst. Nat. ed. xii, i, 504, 1766. Bloch & Schneider, "Systema Natura, 108," 1801.
Doras carinatus Lacépède, Hist. Nat. Poiss. v, 116, 1803 (Surinam); Cuv. & Val. xv, 288, pl. 442, 1840 (Cayenne); Müller & Troschel, Schomburgk, British Guiana, 629, 1848 (Essequibo); Bleeker, Ichthyol. Arch. Indici Siluri 54, 1858; id. Nederl. Tijdschr. Dierkunde, i, 13, 1863 (name only); id. Silures de Suriname, 31, 1864 (Surinam).
Doras (Oxydoras) carinatus Kner, SB. Ak. Wien, xvii, 144, 1855 (Surinam).
Oxydoras carinatus Günther, Cat. Fish. Brit. Mus. v, 206, 1864 (Surinam; Essequibo River); Vaillant, Bull. Soc. Philom. series 7, iv, 154, 1880 (Calderon).
Hemidoras carinatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888.
Doras oxyrhynchus Val. "Humb. Observ. Zool ii, 184, 1833."
Habitat: Guianas, Calderon.

200. Hemidoras orestes.

Oxydoras orestes Steindachner, SB. Ak. Wien, lxxi, 138, pl. i, 1875 (Xingu, Brazil).
Hemidoras orestes Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888 (Huytahy),
Habitat: Xingu; Huytahy.

This species is known to us from 4 specimens .05–.10 m. long. Huytahy.

It agrees very closely with *affinis*, which should perhaps be considered but a variety of *O. orestes*. The only noticeable differences are set forth in the key.

201. Hemidoras affinis.

Oxydoras affinis Steindachner, Flussfische Südam. ii, 7, pl. i, fig. 1, 1881 (Rio Puty).
Hemidoras affinis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 158, 1888 (Rio Puty).
Habitat: Rio Puty.

Body subterete, tapering backward, the depth everywhere greater than the width. Head rather long; higher than wide, the snout long and pointed, the profile not very steep from the dorsal spine to the eye, thence much steeper forward, the space in front of the anterior nostril somewhat concave. Bones of the head finely granular, the sutures showing as smooth grooves; an ovate foramen covered with skin between the dorsal plate, occipital process and a plate of dermal ossification.

Scapula with a distinct dermal ossification, which, at its narrowest part is as wide as the foramen, not meeting the humeral process, its surface finely granular. Fontanel narrow and short, not as long as the eye, its center over the pupil; a bridge across its posterior fifth. Dorsal plate reënforced on the sides by dermal ossifications, their divisions marked by a smooth line.

Eye large, placed high and far back, midway between posterior margin of the dorsal plate and the tip of the snout, measuring, to the orbital rim, 1½–2 in snout, 3–3¾ in head, the interorbital width ⅓–¼ less than the orbital diameter.

Maxillary barbels reaching the gill-opening, except in the old; all the barbels united by a membrane, the mental barbels continuing as a thickening of the membrane, a branch of the thickened membrane of the postmentals extending to the margin of the membrane giving the appearance of an extra outer pair of barbels; the mental barbels short, their bases thickened and covered with short, fleshy cirri.

Snout covered with skin; posterior nares about equidistant between the anterior nares and the eye, the anterior nares about equidistant between the eye and the tip of the snout; mouth very small, wholly inferior; a very small patch of villiform teeth on each intermaxillary, a larger patch on each dentary bone.

Gill-openings rather wide, the isthmus about equaling the orbital diameter. Coracoid bones covered with skin, but externally evident as a ridge.

Lateral scutes low, highest above the anal, their height about ½ orbital diameter, gradually becoming smaller each way, scarcely evident anterior to the tips of the ventrals, but showing as minute imbedded ossicles extending forward to a subdermal process which extends downward from the posterior angle of the dorsal plate to the posterior end of the humeral process. Each scute with a median hook.

Distance of the dorsal fin from the snout 2⅓–2½ in the length; dorsal spine 1⅓–1¼ in the head, serrate on both margins, less coarsely on the inner, the sides striate. Interdorsal space about 4 in the length; the adipose fin free posteriorly, its base about equal to that of the dorsal fin exclusive of the spine.

Caudal fin forked, its rays leathery; accessory rays 10 or 11, the last forming a small plate above and below on the caudal peduncle, the longest rays 1½–1⅓ in the head.

Anal somewhat leathery, slightly emarginate, its highest ray 2–2½ in the head.

Ventrals not reaching the anal, about 2 in the head.

Pectoral spine strong, serrate on both margins, most coarsely on the inner; sides striate.

Small pores in the axil and beneath lower margin of the humeral process making the skin sieve-like.

Humeral process broad and strong, reaching the posterior third of the pectoral spine, its surface striate. One or two thin plates imbedded in the skin above the humeral process.

Light purple above, becoming plain light below; dorsal fin dusky at tip, the pectorals and caudal with very minute dots; ventrals and anal plain light colored. A thin place in the skin above the humeral process, the "tympanum" in an example .14 m. long is narrowly margined with yellow giving the appearance of an ocellus slightly larger than the pupil.

Head 3⅓–3¼; depth 4⅔–5; Lat. l. 19–21; D. I, 6; A. 11–13; V. 7; P. I, 10.

Six specimens .14–.24 m. Rio Puty. O. St. John.

SUBFAMILY AUCHENIPTERINÆ.

ANALYSIS OF THE GENERA OF AMERICAN AUCHENIPTERINÆ.

a. Teeth on the palatines; cleft of mouth extending far past eye. V. 10. ASTEROPHYSUS XLIII.

aa. No teeth on the vomer or palate except sometimes in *Centromochlus intermedius.*

b. Maxillary and four mental barbels present.

c. Mental barbels in two pairs.

d. No adipose fin.

e. V. 15–16; body elongate; anal long; pectoral spine serrate on both margins. TRACHELYOPTERICHTHYS XLIV.

ee. V. 6; body short; anal moderate; pectoral spine smooth on its outer margin. TRACHELYOPTERUS XLV.

dd. Adipose fin about as long as the anal fin; gill-opening continued below base of pectoral. WERTHEIMERIA XLVI.

ddd. Adipose fin much shorter than the anal fin; gill-opening not extending below base of pectoral fin.

f. Anal short, 7–11; mouth terminal, jaws equal; caudal forked; V. 6. CENTROMOCHLUS XLVII.

ff. Anal 19–41.

g. Caudal obliquely rounded or slightly emarginate; outer margin of pectoral spine serrate.

h. Mouth terminal, jaws equal or the lower longer; no prominent bony orbit. Dorsal plate with or without descending process. Caudal truncate or emarginate. V. 6–10. A. 19–40. TRACHYCORYSTES XLVIII.

hh. Mouth inferior, narrower than the snout; anterior orbital bones greatly developed marking an angle between snout and sides of head; head much broader than deep. Dorsal plate with a descending process behind. V. 9–10; A. 26–27. AUCHENIPTERICHTHYS XLIX.

gg. Caudal deeply forked; outer margin of pectoral spine smooth or granular. Head usually covered with smooth skin. Dorsal plate with a descending process behind. Upper jaw longer; head longer than wide; frontal fontanel open in front. V. 8. Anal emarginate, 17–21. FELICHTHYS L.

cc. Mental barbels arranged in a series near the symphysis.

i. Adipose fin none; dorsal fin rudimentary, I. 3. Teeth none. V. 14. EPAPTERUS LI.

ii. Adipose fin short; dorsal fin well developed; I, 6. Teeth villiform. Ventrals 12-15, broadly joined to the belly or connected. Pectoral with 11 or more rays. AUCHENIPTERUS LII.

bb. Maxillary and two mental barbels present. Air-bladder without bony covering. Top of head granular. TETRANEMATICHTHYS LIII.

XLIII. ASTEROPHYSUS.

Asterophysus Kner, SB. Ak. Wien, xxvi, 402, 1857, fig. 13 (*batrachus*).

Type: *Asterophysus batrachus* Kner.

Gape of mouth very wide; teeth on the palate, none on the vomer; lower jaw projecting. Adipose fin small.

This genus is very little known.

202. Asterophysus batrachus.

Asterophysus batrachus Kner, l. c. 403 (Marabitanos); Günther, Cat. Fish. Brit. Mus. v, 200, 1864 (copied).

Habitat: Marabitanos.

Mouth terminal, $\frac{2}{3}$ as long as the head; lower jaw projecting for almost the entire width of the band of teeth; bands of teeth in both jaws interrupted in the middle; intermaxillary band of teeth twice as wide as the mandibulary band and reaching to the rictus. Maxillary barbels reaching to the gill-opening. Mental barbels situated near the symphysis, postmentals reaching to the base of the pectorals. Dorsal spine over the gill-opening, granular in front. First anal ray in the ♂ with a urogenital organ opening near its tip. Light brownish, white below. Head 3; D. I, 5; A. 13; V. 10; P. I, 7. (Kner.)

XLIV. TRACHELYOPTERICHTHYS.

Trachelyopterichthys Bleeker, Nederl. Tijdschr. i, 111, 1863 (*tæniatus*).

Type: *Trachelyopterus tæniatus* Kner.

Adipose fin none. Ventral fin of sixteen rays; anal long; pectoral spine serrated on both margins. Barbels 6, those of the chin disposed in two pairs. Bones of the head exposed, granular. Dorsal plate coalesced with the occipital process. Humeral process present. Gill-membranes confluent with the skin of the isthmus. Teeth villiform, none on the vomer.

203. Trachelyopterichthys tæniatus.

Trachelyopterus tæniatus Kner, SB. Ak. Wien, xxvi, 434, pl. viii, fig. 26, 1857 (Rio Guaporé); Günther, v, 198, 1864 (copied); Steindachner, Flussf. Südamerika's, iii, 4, 1881 (Rio Guaporé; Teffé).

Trachelyopterichthys tæniatus Bleeker, Nederl. Tijdschr. Dierkunde, i, 111, 1863 (name only); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 157, 1888 (Teffé).

Habitat: Solimoens and tributaries.

Body elongate, compressed. Head short and wide, its width greater than its length, its depth slightly less than its length; bones of the head exposed, coarsely granular; sutures distinct; dorsal plate widely forked behind. Fontanel elongate.

Eye small, 5 in the head, 3½ in the interorbital.

Maxillary barbel reaching tip of humeral process; mental barbels short, little longer than the eye; postmentals reaching base of pectorals. Snout short, rounded; jaws equal; teeth all villiform.

Distance of dorsal spine from tip of snout 4–4½ in the length; dorsal spine sharply granular in front, smooth posteriorly; its length 1½ in the head.

Caudal obliquely rounded.

Base of the anal very long, 2⅕–2⅐ in the length.

Ventrals very large, reaching the anal.

Pectoral spine somewhat longer than the head, granular on its lower, finely stirate on its upper surface. Humeral process extending beyond middle of pectoral spine.

Pectoral pore present.

Coffee-colored, all the fins dusky, especially near their tips.

Head 6½; depth 5½–6½; D. I, 4; A. 53; P. I, 8; V. 15–16.

Three specimens .13–.15 m. Teffé. L. Agassiz.

XLV. TRACHELYOPTERUS.

Trachelyopterus Cuv. & Val. Hist. Nat. Poiss. xv, 220, pl. 438, 1840 (*coriaceus*).

Type: *Trachelyopterus coriaceus* Cuv. & Val.

Adipose fin none. Ventral fins of six rays, anal of moderate length. Barbels 6, those on the chin disposed in two series. Bones of the head exposed, granular. Fontanel oval. Dorsal plate coalesced with the occipital process. Humeral process present. Gill-membranes confluent with the skin of the isthmus. Teeth villiform, none on the vomer.

204. Trachelyopterus coriaceus.

Trachelyopterus coriaceus Cuv. & Val. l. c. (Cayenne); Günther, Cat. Fish. Brit. Mus. v, 198, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 157, 1888 (Obidos; Porto do Moz).

Habitat: Amazon; Cayenne.

Body short and compressed. Head short, its width and depth equal to its length; profile steep, snout truncate, the lower jaw entering the profile; bones of the head and the humeral process finely granular.

Eye small, round, 6 in the head, 3½ in the interorbital.

Maxillary barbels reaching about to tip of humeral process; mental barbels about half as long as the head, the postmentals somewhat longer than the maxillary barbels.

Teeth villiform, in narrow bands.

Distance of dorsal spine from snout 3–3½ in the length; dorsal spine weak, terete, its anterior margin smooth, its posterior with short teeth; its height little less than the head.

Caudal obliquely rounded. Ventrals reaching the anal.

Pectoral spine smooth on its outer margin, short teeth on its inner margin, 1 in the head. Humeral process extending a little past the middle of the pectoral spine.

Color everywhere dusky; dorsal fin with oblique bars; pectoral and ventral fins nearly black; ventral surface lighter, with rather large brown dots.

Head 5; depth $3\frac{3}{5}$–4; D. I, 5; A. 32.

Twenty specimens examined, the largest measuring .105 m.

Obidos; Porto do Moz. Senhor Vinhas.

204a. Trachelyopterus coriaceus maculosus.

Trachelyopterus coriaceus maculosus Eigenm & Eigenm. Proc. Cal. Acad. 2d Ser. i, 157, 1888 (Porto do Moz).

A single specimen from Porto do Moz (No. 7,337) has the sides light brown with longitudinal series of oblong rusty-brown spots.

XLVI. WERTHEIMERIA.

Wertheimeria Steindachner, SB. Ak. Wien, lxxiv, 1876. Süsswasserfische südöstl. Bras. iii, 102, pl. x (*maculata*).

Type: *Wertheimeria maculata* Steindachner.

Adipose fin as long as the anal fin; gill-opening extending to the lower side of the head.

205. Wertheimeria maculata.

Wertheimeria maculata Steindachner, l. c. (Jequitinhonha).

Bones of the head granular. Eye $7\frac{1}{6}$–$8\frac{1}{4}$ in the head. Upper jaw slightly projecting; teeth setiform, none on the palate. Head somewhat wider than long. Maxillary barbels extending beyond the first third of the pectoral, postmentals to its base. A granular plate on the sides between the humeral process and the dorsal plate. Humeral process extending beyond middle of pectoral spine. Dorsal spine shorter than the head, serrated on its anterior margin. Pectoral spine very long and depressed, much longer than the head. Caudal emarginate. Pectoral pore present. Back and sides brown, with lighter spots.

Head $4\frac{3}{4}$; depth $4\frac{3}{4}$–$4\frac{1}{2}$; D. I, 6; P. I, 9; V. I, 5–6; A. 15–16. (Steindachner.)

XLVII. CENTROMOCHLUS.

Centromochlus Kner, SB. Ak. Wien, xxvi, 430, 1857 (*megalops*=*heckelii*).

Glanidium (Reinhardt MS.), Lütken Dan. Vid. Selsk. 31, 1874 (*albescens*).

Type: *Centromochlus megalops* Kner.

Barbels six, those on the mandible short and disposed as two pairs. Palatine teeth none; vomer occasionally with teeth. Eyes very variable in size, covered with skin. Adipose fin very short. Dorsal fin of a spine and 4 or 5 rays. Anal short. Ventrals inserted posterior to the dorsal, with 6 rays. Humeral process present. Occipital process firmly joined to the dorsal plate. Bones of the head naked, granular except in *albescens*. Gill-membranes confluent with the skin of the isthmus.

Habitat: Streams from Rio Janeiro to Canelos and Guiana.

We here consider *Glanidium* as a subgenus of *Centromochlus*. In cases like this where characters are of doubtful value it must remain merely an opinion whether the form under consideration is a genus or subgenus.

DOUBTFUL SPECIES OF CENTROMOCHLUS.

205.1. *Arius oncina* Schomburgk, Fishes of Guiana, part i, 173, pl. iv, 1841 (Rio Padauiri).

ANALYSIS OF THE SPECIES OF CENTROMOCHLUS.

a. Head granular above. (CENTROMOCHLUS).
  b. Eye very large, directed downward more than upward. Pectoral spine long, reaching the ventrals. *heckelii*, 206.
  bb. Eye moderate or small, lateral.
    c. Body plain or with light spots.
      d. A. 7; eye 4 in the head; maxillary barbels nearly coterminous with the pectoral fins. Dorsal plate with its process extending inward behind. Height of the dorsal not much less than the length of the head; the spine obsoletely serrate behind. Pectoral

fins nearly ⅓ of the length, not reaching the ventrals. Grayish, tinged with silvery on the sides. (Gill.) *steindachneri* 207.

dd. A. 9 or 10; eye 4 in head. Dorsal plate with its processes extending outward behind. *intermedius* 208.

cc Body with dark spots or bars.

e. Eye 2⅔ in the head; pectoral spine longer than the head; fins, except the caudal, yellow, sides of the body with dark spots. Bones of the head finely granular. Snout very short, rounded. Anterior margin of the dorsal spine serrate; pectoral spine serrated along the entire length of both margins. D. I, 5; A. 8; P. I, 5; V. 6. (Steindachner.) *perugiæ* 209.

ee. Eye 4 in the head; pectoral spine as long as the head; dorsal and caudal fins with blackish or whitish spots and dots. *aulopygius* 210.

aa. Head covered with skin. (GLANIDIUM.) *albescens* 211.

206. Centromochlus heckelii.

Auchenipterus heckelii Filippi, "Guér. Rev. et. Mag. Zool. 166, 1853."

Centromochlus heckelii Günther, Cat. Fish. Brit. Mus. v, 197, 1864 (copied); Cope, Proc. Am. Philos. Soc. xvii, 677, 1878 (Peruvian Amazon); Vaillant, Bull. Soc. Philom. series 7, iv, 1880 (Calderon); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 156, 1888. (Villa Bella; Obidos; Para; Tabatinga; Gurupa; Manacapuru; Lago Alexo; Hyavary).

Centromochlus megalops Kner, SB. Ak. Wien, xxvi, 430, pl. viii, fig. 24, 1857 (Bogota).

Habitat: Amazons and tributaries.

Body slender, terete, tapering backward. Head subconical, uniformly arched in transverse profile, except on the interorbital region which is flattish, its width little greater than its depth, 1¼ in its length. Surface of the bones granular. Dorsal plate continued backward to the second dorsal ray, with an inward projecting process behind, leaving an arrow-shaped area in which the anterior part of the dorsal fin is situated. Humeral process long and slender, about reaching the vertical from the posterior margin of the dorsal plate; its surface granular. Fontanel elongate, widest behind.

Pectoral pore small, situated above the last pectoral ray.

Maxillary barbel lying in a groove below the eye, reaching about to tip of pectoral spine; mental barbel about as long as the eye, postmentals considerably shorter.

Distance between the anterior and posterior nares about one-fourth the diameter of the eye.

Eyes large, the distance between their inferior margins much less than between their superior margins, the diameter of the eye 2–2⅔ in head, 1⅓ in interorbital.

Mouth very small, inferior, its width less than a diameter of the eye; lower jaw thin and pointed in front; all the teeth villiform, the intermaxillary band with a backward projecting angle on the outer margin.

Distance of dorsal spine from the snout 2½–2⅗ in the length; dorsal spine roughened on both margins, higher than the length of the head, 3⅖–3⅗ in the length. Adipose fin small, situated posterior to the anal fin.

Caudal fin widely forked, the lobes pointed, 3½–4 in the length. Anal fin very short.

Pectoral spine slender, smooth on the sides, roughened in front, short teeth along its entire margin behind, about reaching the ventral fin, 2⅗ in the length.

Back chocolate with black dots, usually a plumbeous lateral band, becoming abruptly silvery below; the sides sometimes punctate with black or dark brown; top of head and around the eyes dotted with black, opercles silvery, sometimes punctate; sometimes the humeral region is yellow and the belly golden; caudal, ventral and pectoral fins more or less dusky. This species has the general appearance of an *Exocœtus*.

Head 3⅘–4, to end of dorsal plate 2⅖–2⅗; depth 6; D. I, 5–6; A. 7; V. 6; P. I, 6–10.

Over ninety specimens examined, the largest measuring .08 m. Villa Bella; Obidos; Para; Tabatinga; Gurupa; Manacapuru; Lago Alexo; Hyavary.

207. Centromochlus steindachneri.

Centromochlus steindachneri Gill, Proc. Acad. Nat. Sci. Philad. 1870, 95 (Upper Amazon).

Habitat: Upper Amazon.

208. Centromochlus intermedius.

Centromochlus intermedius Steindachner, Süsswasserf. südöstl. Bras. iii, 106, foot note (Marabitanos; Para); id. Flussfische südam. iii, 4, 1881 (Hyutahy; Jatnarana); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 156, 1888 (Tajapuru; Teffé; Jatuarana; Iça; Jutahy; Lago Alexo).

Habitat: Amazon, Solimoeus and tributaries from Para to Teffé.

The depth everywhere greater than the width. Caudal peduncle very high and compressed. Head short and broad, slightly arched in transverse profile, its width little less than its length, its depth 1⅕–1⅙ in its length; the surface of the bones finely granular; the dorsal plate with an outward projecting process behind. Humeral process extending obliquely upward, almost or quite meeting the scapula. Fontanel oblong. Distance between the anterior and posterior nares 1½ in the eye.

Jaws equal; mouth terminal, its width at the angles less than 2 in the length of the head; teeth villiform, a small patch of teeth on one side of the vomer in the ♀ specimen.

Eye 3½ in the head, 2¾ in the interorbital.

Maxillary barbel extending beyond the humeral process; mental barbels short. Pectoral pore small.

Distance of dorsal spine from the snout 3–3⅖ in the length; dorsal spine as long as the head, its anterior margin serrate, its posterior margin smooth.

Caudal deeply emarginate, the upper lobe in the ♂ somewhat produced and pointed, 3–4⅓ in the length.

Base of anal rather long in the ♀, the rays closely crowded in the ♂.

Ventrals not reaching the anal.

Pectoral spine broad, serrated on both margins, the teeth on the outer blunt, those on the inner margin sharp, sides of the spines granular.

Color rusty brown, ventral surface white, the chin very dark brown in one specimen; the lower fins whitish, caudal, adipose, and base of dorsal fin rusty brown. Young with short whitish streaks along the sides.

Head 4⅘–5; depth 5–5½; D. I, 5; A. 10.

Seven specimens, length .035–.15 m. Tajapuru; Teffé; Jatuarana; Içа; Jutahy; Lago Alexo.

209. Centromochlus perugiæ.

Centromochlus perugiæ Steindachner, Flussfische Südam, iv, 29, pl. vii, figs. 2-2a, 1882 (Canelos).

Habitat: Canelos.

210. Centromochlus aulopygius.

Centromochlus aulopygius Kner, SB. Ak. Wien, xxvi, 432, pl. viii, fig. 25, 1857 (Rio Guaporé); Günther, Cat. Fish. Brit. Mus. v, 198, 1864 (Essequibo). Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 157, 1888 (Cudajas).

Habitat: Rio Guaporé; Cadajas; Essequibo.

Body somewhat compressed. Head short, rounded in front; top of head finely granular; the backward-projecting process of the dorsal plate simple, not turned outward or inward behind.

Jaws equal, mouth oblique. Maxillary barbel extending to middle of pectoral spine.

Dorsal spine smooth posteriorly, with strong teeth on its upper half anteriorly. Caudal emarginate.

Pectoral spine strongly serrate on both margins.

Humeral process extending beyond middle of pectoral spine.

Light brownish, mottled with darker; a dark lateral band; dorsal fin dark brown; caudal mottled with darker, a dark longitudinal line on the upper and lower lobes.

Head 4; depth 4½; D. I, 4; A. 8.

One specimen .045 m. Cudajas. Thayer Expedition.

211. Centromochlus albescens.

Glanidium albescens (Reinhardt MS.) Lütken, Dan. Viden. Selsk. 31, 1874 (Rio das Velhas and tributaries); id. 1875, pl. iii, fig. 5; Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 157, 1888 (Rio Parahyba; Rio Janeiro; Macacos).

Centromochlus (*Glanidium*) *albescens* Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 106 (Rio Parahyba.

Habitat: Coast streams from Rio Janeiro to the Amazon.

Body about as wide as deep, compressed toward the caudal fin. Head broad, depressed, flattish above in the adult, its width little less than its length, its depth 1⅓ in its length; surface of the bones roughened but everywhere covered with skin. Dorsal plate with an outward-projecting process behind. Fontanel elongate; snout abruptly decurved, broadly rounded in front. Space between anterior and posterior nares little less than the diameter of the eye.

Eye lateral, 4–5 in the head, 2½–3 in the interocular.

Maxillary barbel reaching beyond the tip of the humeral process; mental barbels short.

Jaws equal, the mouth terminal; teeth villiform, the intermaxillary band about eight times as broad as deep. Humeral process extending somewhat beyond middle of pectoral spine. Pectoral pore wanting.

Lateral line straight.

Distance of dorsal spine from snout 3 in the length; dorsal spine short, smooth or slightly roughened on both margins, 1½–2 in the head.

Caudal forked, 4–4¾ in the length.

Base of the anal rather long, 2½–2¾ in the head.

Ventrals not reaching the anal.

Pectoral spine short and stout; its sides finely striate, the inner margin entirely dentate, the outer margin smooth on its basal half, with teeth on the upper half.

Ventral surface white, sometimes with a few dots on the chin; sides grayish, becoming darker on the dorsal surface; sides and back covered with dark dots which are aggregated into spots in places; basal third of the caudal fin yellowish, abruptly dusky or black behind; other fins more or less dotted and spotted with black, the dorsal always darkest.

Head 4¼–4½; depth 4½–5; D.I, 5; A. 10–11; V. 6; P. I, 6.

Numerous specimens, .07–.16m. Rio Parahyba; Rio Janeiro; Macacos.

XLVIII. TRACHYCORYSTES.

Trachycorystes Bleeker, Nederl. Tijdschr. Dierkunde, i, 88, 1863 *(typus=trachycorystes)*.

Paraucheniptertus Bleeker, l. c. *(galeatus)*.

Type: *Trachycorystes typus* Bleeker.

Caudal obliquely truncate or slightly emarginate; posterior portion of the anal convex. Lower jaw usually projecting. Barbels six, those of the mandible disposed in two pairs. Teeth villiform, none on the vomer or palate. Eye small, lateral, covered with skin. Adipose fin very short. Dorsal fin with a spine, and from 4 to 6 rays. Anterior rays of the anal in the ♂ enlarged, bearing the urogenital organ. Ventral fins free, with from 6–10 rays. Pectoral spine strong, serrated on both margins. Occipital process firmly joined to the dorsal plate, the latter with or without a descending angle behind.

Habitat: Rio Janerio to Rio Magdalena and Peru.

As here understood, this genus contains various elements which it may become necessary to separate generically; on account of the scarcity of our material we have not thought it best to do so at present.

ANALYSIS OF THE SPECIES OF TRACHYCORYSTES.

a. **Head covered with thick, smooth skin. Eye 7 in head; lower jaw projecting; head depressed; fontanel surrounded by bone; snout short, strongly rounded in front. Maxillary barbels longer than head; pectoral spine 1¼, dorsal spine 1¼, width of head 1 in length of head; pectoral spine more strongly toothed on inner than on outer margin, strongly depressed, stronger than dorsal spine which is smooth on outer margin, with weak teeth on inner; humeral process pointed, granular. Pectoral pore wanting. Caudal obliquely rounded, upper lobe a little longer. Lat. l. nearly straight. Color reddish violet; blackish marblings on top of head and elongate spots on body; fins with dark spots** and marblings; ventral surface bright yellow dotted with violet. Head 4; depth about 4; D. I, 5; A. 23; V. 7–8; P. I, 7. (Steindachner.) *glaber* 212.

aa. Head granular above.

b. Caudal emarginate.

c. Fontanel open in front.

d. Maxillary bone short; dorsal spine straight or only slightly curved.

e. Dorsal spine as long as the pectoral spine. V. 7; D. I, 5; A. 22; dorsal spine finely serrate on both edges, pectoral spine more coarsely; mandible a little projecting. Eye obscure. Maxillary barbels reaching end of pectoral spine; mental barbels about equal to orbital diameter. Humeral process reaching beyond middle of pectoral spine, coarsely striate, the striæ nodular. Head finely rugose above, not covered with skin. Lead color; dorsal fin with a black spot above. Head rather wide, 4 in the length. (Cope.) *isacanthus* 213.

dd. Maxillary bone extending to posterior margin of the eye or much longer; dorsal spine curved forward with two groups of spines on its anterior margin. Maxillary barbel reaching to the tip of the pectoral. Lower jaw somewhat projecting; eye 4½–5⅕ in the head. Fontanel open in front. Humeral process extending a little beyond the middle of the pectoral spine; posterior edge of the dorsal smooth. Yellowish brown, more or less flecked and dotted with darker brown. Head 4⅗–4½; depth 4½–4; D. I, 6; A. 26; P. I, 7; V. 6. (Steindachner.) *insignis* 214.

cc. Fontanel closed in front.

f. Anal 19–20; D. I, 5; V. 9. Head rather coarsely granulated above; lower jaw a little projecting. Maxillary and postmental barbels extending to or beyond tip of humeral process; mental barbels twice or thrice as long as the eye. Humeral process extends beyond middle of pectoral spine. Dorsal spine serrated along its outer margin; pectoral spine along both edges; dorsal spine considerably shorter than the pectoral spine which is as long as the head. Head 4 in the length. Lat. l. irregularly undulated. Uniform brownish black. (Günther.) *obscurus* 215.

ff. Anal 27–30; D. I, 6. Profile straight; fontanel elongate, usually open in front. Pectoral spine with strong hooks on both edges, dorsal spine rough on its anterior, smooth on its posterior margin. Humeral process extending beyond middle of pectoral spine. Maxillary barbel little longer or shorter than the head. Lower jaw projecting. Eye 3¾–4 in the head. Back dark violet with innumerable darker dots, lower parts lighter, middle of caudal with a dark bar. Head 4–4⅓; V. 6; P. I, 6. (Steindachner.) *magdalenæ* 216.

bb. Caudal obliquely truncate or rounded; lower jaw longer.

g. Anal rays normal, 28 or fewer.

h. V. 9 or 10. Pectoral spine not reaching beyond the tip of the humeral process. Dorsal plate with a descending process behind; fontanel oval; lower jaw projecting. Head about as wide as long. Dorsal spine almost as long as the pectoral spine. Head 5; D. I, 6; A. 20; P. I, 6. (Cuv. & Val.) *trachycorystes* 217.

hh. V. 6 or 7. Pectoral spine reaching beyond the tip of the humeral process. Dorsal plate without a descending process.

i. D. I, 4-5.

j. V. 6. Humeral process ascending more or less obliquely backward.

k. Humeral process extending beyond middle of pectoral spine.

l. A. 20; mental barbels scarcely reaching to the base of the postmentals; head as wide as long. Eye 7 in the head, 1½ diameters from the rictus; maxillary barbels reaching beyond postmentals to the base of the pectoral spine. Dorsal spine thick, serrate in front, lower than the following rays. Pectoral spine longer than the dorsal spine. Dark brown with elongate blackish spots; ventral surface white, sometimes covered with brown dots; all the fins more or less thickly spotted with brown. Head 4. (Kner.) *ceratophysus* 218.

ll. A. 24-25; mental barbels extending beyond base of postmentals, 1⅔ in head. Bones of the head coarsely granular, the occipital bone with three pore-bearing grooves forming a π-shaped figure. *porosus* 219.

kk. Humeral process not reaching the middle of the pectoral spine. A. 25-27. *striatulus* 220.

jj. V. 7. Head coarsely granular; fontanel reduced to a small round hole. Maxillary barbels reaching to the middle of the pectoral spine. Eye less than ⅙ the interorbital width. Humeral process half as long as the pectoral spine. Dorsal spine dentate in front, half as long as the pectoral spine. Blackish above, brown below, lower parts of sides with dark spots. Head 4; depth 5; D. I, 5; P. I, 6; A. 22-23. (Cope.) *brevibarbus* 221.

ii. D. I, 6; V. 6.

m. A. 22-24, rarely 25. *galeatus*, 222.

mm. A. 28. Bones of the head scarcely granular; fontanel ovate; maxillary barbels extending to the end of the pectoral: mental barbels not quite half as long as the head. Humeral process extending to the posterior third of the pectoral spine. Dorsal spine shorter and more feeble than pectoral spine, crenulated in front. Pectoral spine as long as head. Uniform dark brown. Head 5; P. I, 7. (Günther.) *robustus* 223.

gg. Anal rays greatly crowded, 41, the base of the anal not longer than in the preceding species. *analis* 224.

212. Trachycorystes glaber.

Auchenipterus glaber Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstl. Bras. iii, 97, foot note (Demarara).

Trachycorystes glaber Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 154, 1888 (name only).

Habitat: Demarara.

This species is known only from the types in the Vienna Museum.

213. Trachycorystes isacanthus.

Auchenipterus isacanthus Cope, Proc. Am. Philos. Soc. xvii, 677, 1878 (Peruvian Amazon).

Trachycorystes isacanthus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 154, 1888 (name only).

Habitat: Marañon.

214. Trachycorystes insignis.

Auchenipterus insignis Steindachner, Fisch-fauna Magd. Stromes, 19, pl. iii, figs. 2-2*a*, 1878 (Magdalena River); id. Fisch-fauna des Cauca & Flüsse bei Guayaquil, 10, 1879 (Cauca).

Trachycorystes insignis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 154, 1888 (name only).

Habitat: Rio Magdalena and its tributaries.

This species is known only from the description and figure by Dr. Steindachner.

215. Trachycorystes obscurus.

Auchenipterus obscurus Günther, Ann. & Mag. Nat. Hist. xii, 442, 1863 (Essequibo); id. Cat. Fish. Brit. Mus. v, 195, 1864.

Trachycorystes obscurus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 154, 1888 (name only).

Habitat: Essequibo.

This species is known only from the types in the British Museum.

216. Trachycorystes magdalenæ.

Auchenipterus magdalenæ Steindachner, Fisch-fauna Magd. Stromes, 20, pl. iv, figs. 1-1*a*, 1878 (Magdalena River).

Trachycorystes magdalenæ Eigenm & Eigenm. Proc. Cal. Acad. 2d Ser. i, 155, 1888 (name only).

Habitat: Magdalena River.

This species is known only from the types in the Vienna Museum.

217. Trachycorystes trachycorystes.

Auchenipterus trachycorystes Cuv. & Val. Hist. Nat. Poiss. xv, 214, pl. 437, 1840 (Brazil?); Günther, Cat. Fish. Brit. Mus. v. 195, 1864 (copied).

Trachycorystes trachycorystes Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 154, 1888 (name only).

Trachycorystes typus Bleeker, Nederl. Tijdschr. Dierkunde, i, 88, 1863 (name only).

Habitat: ?

218. Trachycorystes ceratophysus.

Auchenipterus ceratophysus Kner, SB. Ak. Wien, xxvi, 427, pl. vii, fig. 23, 1857 (Matogrosso; Rio Guaporé; Rio Branco; Rio Negro); Günther, Cat. Fish. Brit. Mus. v, 196, 1864 (copied).

Trachycorystes ceratophysus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 154, 1888 (name only).

Habitat: Guaporé; Rios Negro and Branco.

This species is known only from the types.

219. Trachycorystes porosus.

Trachycorystes porosus Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. i, 154, 1888 (Brazil).

Habitat: Brazil.

Short and robust, little compressed; width of the head about equal to its length, its depth 1¼ in its length. Bones of the head coarsely granular. Fontanel oval. Snout and sides of the head with conspicuous pores. Three grooves on the occipital bone form a π-shaped figure, and are studded with pores; other pores on top of the head.

Eye circular, 2 in the snout, 7 in the head, 4½ in the interocular.

Maxillary and postmental barbels extending a little beyond base of pectoral; mental barbels extending beyond insertion of postmentals, measuring 1⅗ in the length of the head.

Lower jaw projecting; teeth fine, the intermaxillary band about 8 times as wide as deep.

Humeral process extending obliquely upwards, strongly granular, its lower margin serrate; reaching a little beyond middle of pectoral spine.

Distance of dorsal spine from snout 3–3½ in the length; dorsal spine slender, 1⅔–2 in the head, its inner margin roughened, its anterior margin with a median series of diverging spines and two series of smaller teeth, the first ray higher than the spine. Space between dorsal and adipose fins 2½ in the length; anterior margin of the adipose fin continuous with the profile of the back.

Caudal obliquely truncate.

Anal fin strongly convex behind, higher posteriorly than anteriorly.

Pectoral spine strongly serrate, the outer teeth much longer than the inner ones, especially near the tip of the spine, the flattened sides strongly granular, the granules enlarged anteriorly, forming serræ along either side of the long spine-like marginal teeth; the length of the spine 5–6 in the length.

Lateral line somewhat undulating, with conspicuous pores.

Dark reddish brown, with longitudinal interrupted bands; belly plain, lower side of head thickly dotted with darker; dorsal and anal fins spotted; caudal fin with irregular dark cross bars; inner surface of ventral and pectoral fins more or less dusky.

Head 4–4½; depth about 3½; D. I, 5; A. 25; V. 6; P. I, 7.

220. Trachycorystes striatulus.

Auchenipterus striatulus Steindachner, Süsswasserfische südöstl. Bras. iii, 98, pl. v, 1876 (Rio Parahyba; Rio Doce; Rio Mucury).

Trachycorystes striatulus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 155, 1888 (Linhares; Rio Doce; Itabapuana; Campos; Sao Matheos; Gurupa).

Habitat: Mouths of rivers draining eastern Minas Geraes; Rio Para.

Robust, compressed behind; depth below dorsal spine equal to the width. Head short, about as broad as long, rounded in front, slightly convex in transverse profile in the young, flattish in the adult; surface of the bones granulate, sometimes covered with villous skin in the ♀

Fontanel elongate, open in front in the young, reduced to a round opening and entirely surrounded by bone in the adult. Occipital process very broad; dorsal plate more than twice as wide as its length on a median line, having two long, backward, projecting processes which are not curved downward.

Eye small, lateral, 1½ in snout, 6–7 in head, 4–4½ in interocular. Snout blunt, the width at rictus 1¾ in the length of the head; lower jaw somewhat projecting; teeth villiform, the intermaxillary band deepest in the middle, about 8 times as wide as deep.

Maxillary barbel reaching about to middle of pectoral, mental barbel 1¾–2½ in length of head, postmental barbel reaching a little beyond base of pectoral.

Humeral process not extending to middle of pectoral spine, its surface with sharp granules, its lower edge serrate. Pectoral pore wanting.

Distance of dorsal spine from snout 3–3⅕ in the length; dorsal spine in ♂ about equal to or longer than the pectoral spine, 4½–6½ in the length; the anterior margin of the dorsal spine with numerous diverging thorn-like spines, the posterior margin smooth; the first soft ray shorter than the spine. Distance between dorsal and adipose fins 2¼–2⅒ in the length. Caudal fin obliquely truncate, the upper longer rays 5–5½ in the length.

Anal fin high, strongly rounded posteriorly, the anterior two or three rays approximated and elongated, bearing the urogenital organ.

Ventral fins short, broad, 1½–2 in the head.

Pectoral spine strong, with strong teeth on both margins and short serrations on each side of the larger teeth on the anterior margin.

Dark brown, the head with darker spots, the sides with elongate dark spots and numerous dark points on lower half of sides, sometimes extending upon the ventral surface; vertical fins variously marked; ventral and pectoral fins sometimes light colored, sparingly spotted with brown, sometimes very dark, the upper surface always the darker.

Head 4½–5; depth, below dorsal, 4⅓–5½; above first anal ray 3⅗–4½; D. I, 4–5; A. 25–27; V. 6; P. I, 6.

♀ specimens differ from the above description in having the dorsal spine much shorter than the pectoral spine, 6–7 in the length, both margins smooth or the outer slightly serrate, the first soft ray higher than the spine; the serrations on the outer edge of pectoral spine are occasionally reduced to granulations; the anterior anal rays normal. The head is less flattened.

Fifty specimens, .075–.235 m. Linhares, Rio Doce; Itabapuana; Campos; Sao Matheos; Gurupa. Hartt & Copeland.

221. Trachycorystes brevibarbus.

Auchenipterus brevibarbus Cope, Proc. Am. Philos. Soc. xvii, 676, 1878 (Peruvian Amazon).

Trachycorystes brevibarbus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 155, 1888 (name only).

Habitat: Marañon.

222. Trachycorystes galeatus.

Silurus galeatus Linnæus, Syst. Nat. ed. xii, 503, 1766 (based on Seba, iii, pl. 29, fig. 7); id. ed. xiii, 1357, 1788; Bloch, Ausländische Fische, part 8, 39, pl. 369, fig. 1, 1794; Bloch & Schneider, "Syst. Ichthyol. 384, 1801."

Pimelodus galeatus Lacépède, Hist. Nat. Poiss. v, 97 and 114, 1803 (South America).

Auchenipterus galeatus Günther, Cat. Fish. Brit. Mus. v, 196, 1864 (Guiana); Peters, MB. Ak. Berl, 470, 1877 (Calabozo).

Parauchenipterus galeatus Bleeker, Nederl. Tijdschr. Dierkunde, i, 88, 1863 (name only).

Trachycorystes galeatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 155, 1888 (Pernambuco; San Gonçallo; Rio San Francisco, below the falls; Tabatinga; Teffé; Rio Puty).

Auchenipterus maculosus Cuv. & Val. Hist. Nat. Poiss. xv, 216 (Cayenne), Kner, SB. Ak. Wien, xxvi, 425, 1857 (Marabitanos); Günther, Cat. Fish. Brit. Mus. v, 196, 1864 (Surinam, Essequibo); Vaillant, Bull. Soc. Philom. series 7, iv, 154 (Calderon).

Auchenipterus immaculatus Cuv. & Val. Hist. Nat. Poiss. xv, 218, 1840 (Cayenne).

Auchenipterus punctatus Cuv. & Val. Hist. Nat. Poiss. xv, 219, 1840 (? Brazil); Kner, SB. Ak. Wien, xxvi, 425, 1857 (Rio Branco).

Auchenipterus lacustris Lütken, Dan. Selsk. Skr. 1875, δ, 148, with fig. (Rio das Velhas).

Habitat: Rio San Francisco to the Orinoco.

Robust, somewhat compressed. Head short, chubby; width of the head as great as, or greater than its length; width of the mouth $1\frac{2}{5}$–$1\frac{3}{4}$ in the length of the head; depth at the occipital process about equal to the length of the head. Bones of the head and humeral process granular. Occipital process with its sides emarginate, with rather long backward projecting processes which are not curved downward behind, its least width more than twice its least length. Fontanel pear-shaped, open in front in the young, becoming reduced to a small round opening between the frontals in the old.

Eye $1\frac{2}{3}$ in snout, 6 in head, $4\frac{1}{2}$ in the interocular.

Lower jaw considerably longer; teeth all short, villiform or setiform, intermaxillary band very shallow, its depth 10 in its width.

Maxillary barbel reaching tip of humeral process or a little farther; mental barbel about half length of head, postmental reaching a little beyond base of pectoral.

Gill-opening not extending below base of pectoral. Humeral process variable in length, always reaching beyond middle of pectoral. Pectoral pore present, well forward.

Distance of dorsal spine from snout $2\frac{4}{5}$–3 in the length; dorsal spine varying in height, 1–$1\frac{3}{4}$ in the head, its anterior margin almost smooth, granular, or with rather sharp teeth, its posterior margin sometimes with distinct teeth, sometimes almost smooth; first dorsal ray usually somewhat higher than the spine.

Distance between dorsal and adipose fins $2\frac{1}{2}$–$2\frac{1}{3}$ in the length; adipose fin rather large, its anterior margin continuous with the profile of the back.

Caudal obliquely truncated, the longest rays about 5 in the length. Anal fin comparatively short, its free margin either straight or emarginate in front, always strongly convex behind.

Ventrals short and broad, reaching the anal, about 1¾ in the head.

Pectoral spine very strong, of varying length, sometimes reaching half way to the base of the ventrals, sometimes half way to the anal, 4–5 in the length. First pectoral ray about as long as the spine.

Color variable; sometimes light brown with dark spots on the dorsal, caudal and pectoral, the anal and ventrals white. Sometimes darker brown, mottled with darker, and all the fins profusely spotted; ventral surface thickly covered with brown or black dots.

Head 4⅓–4¾; depth 3–4½; D. I, 6; A. 22–24, rarely 25; V. 6; P. I, 7.

Specimens .065–.22 m. Pernambuco; San Gonçallo; Rio San Francisco, below the falls; Tabatinga; Teffé; Rio Puty.

223. Trachycorystes robustus.

Auchenipturus robustus Günther, Cat. Fish. Brit. Mus. v, 197, 1864 (Demarara).

Trachycorystes robustus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 156, 1888 (name only).

Habitat: Demarara.

This species is known only from the types.

224. Trachycorystes analis.

Trachycorystes analis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 156, 1888 (? Arary).

Width of the head equal to its length; width of the mouth 1¾ in length of head; the depth at the occipital process 1¼ in the length of the head. Fontanel oval, surrounded by bone.

Mental barbels less than one-third the length of the head.

Dorsal spine 1⅙ in head, its anterior margin smooth, except near the tip, its posterior margin slightly serrate.

Caudal broken.

Anal rays crowded, gradually decreasing in height backward, the margin undulating.

Pectoral spine very strong, 3½ in the length.

Dark brown; ventral surface dusky, with numerous dark points; dorsal fin with dark spots, most prominent near the free margin; tips of ventrals dusky, the base profusely dotted, the intermediate region almost plain yellowish; pectoral fin profusely spotted.

Head 4; depth 4¾; D. I, 6; A. 41; V. 6; P. I, 7.

XLIX. AUCHENIPTERICHTHYS.

Auchenipterichthys Bleeker, Nederl. Tijdschr. Dierkunde, i, 89, 1863 (*thoracatus*).

Type: *Auchenipterus thoracatus* Kner.

Caudal obliquely truncate or rounded, jaws subequal. Barbels six, those of the mandible disposed in two pairs. Teeth villiform, none on vomer or palate. Eye large, lateral, covered with skin. Adipose fin very short; dorsal fin with a spine and six rays. Anterior rays of anal in the ♂ elongate, bearing the urogenital organ. Ventral fins free, with 9 rays. Pectoral spine strong, serrated on both margins. Occipital process firmly joined to the dorsal plate. Anterior orbital bones prominent. Head wider than deep, the bones granular, the sutures distinct. Pectoral pore present.

Habitat: Amazon.

225. Auchenipterichthys thoracatus.

Auchenipterus thoracatus Kner, SB. Ak. Wien, xxvi, 425, pl. vii, fig. 22, 1857 (Rio Guaporé).

Auchenipterichthys thoracatus Bleeker, Nederl. Tijdschr. Dierkunde, i, 89, 1863 (name only); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser, i, 154, 1888 (Coary; Hyavary).

Auchenipterus thoracicus Günther, Cat. Fish. Brit. Mus. v, 194, 1864 (copied).

Habitat: Solimoens and its tributaries.

Body short and rather robust; depth greatest below the dorsal spine, everywhere greater than the width. Head short and broad; its greatest depth 1⅓ in its length, its greatest width about equal to its length; width at the rictus 1½–1⅓ in its length. Snout broad and rounded in front, depressed. Fontanel open in front. Dorsal plate twice as wide at the narrowest part as its length on a median line, with a descending process behind, the surface of the dorsal plate granular. Scapular process almost meeting the humeral process. Coracoid process exposed, granular, forming a plate on the sides of the abdomen.

Eye with a bony orbit, its diameter twice as long as the snout, 3 in head, 2 in interorbital.

Mouth narrow, inferior, its width 2–2¼ in the head; teeth all villiform, the intermaxillary band somewhat shallower in the middle.

Maxillary barbel reaching to base of pectoral; mental barbels shorter than the eye, postmental little longer than the eye, the barbels longer in small examples.

Gill-opening reaching base of pectoral. Humeral process long and pointed, reaching beyond the middle of the pectoral spine, its surface more granular than the bones of the head. Pectoral pore small.

Distance of dorsal spine from the snout 2⅗ in the length; dorsal spine in the ♂ sometimes reaching the adipose fin, 2⅓–3⅓ in the length, in the ♀ much shorter, 3½–4 in the length, its outer margin slightly roughened, its inner margin with wide-set teeth. Distance between the dorsal and adipose fins 2½–2⅘ in the length.

Caudal fin obliquely truncate, the upper rays longest, about 4 in the length.

Anal rounded or truncate in the ♀, concavo-convex in the ♂, the longest ray scarcely reaching beyond the middle of the fin.

Ventral fins short, 1½ in the head.

Pectoral spine about reaching the base of ventral, sometimes a little beyond; 3–3¼ in the length; soft rays of the pectoral shorter than the spine.

Dorsal surface light rusty brown; sides and ventral surface plain lighter; humeral region sometimes dotted; upper caudal rays dusky; base of caudal and adipose fins with brown dots; other fins plain, light colored. In the young the tips of the upper caudal rays are rusty.

Head 4½; depth 5; D. I, 6; A. 23–26; V. 9; P. I, 8–9.

Fifty-six specimens examined .055–.13 m. Coary; Hyavary. Agassiz and Bourget.

226. Auchenipterichthys longimanus.

Auchenipterus longimanus Günther, Cat. Fish. Brit. Mus. v, 195, 1864 (River Capin, Para).

Auchenipterichthys longimanus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 154, 1888 (Maues, Rio Maderia; Cameta).

Habitat: Southern tributaries of the Amazon.

Rather stout, little compressed. Head short and broad, its greatest depth 1⅓ in its length, its greatest width 1, width at the rictus 1⅓; surface of the bones finely granular, the sutures not conspicuous externally, naked. Dorsal plate broad, a descending process behind. Fontanel open in front.

Eye 3⅓ in the head, 2⅔ in the interocular distance, longer than the snout.

Maxillary barbel extending to the middle of the humeral process, mental barbels shorter than the eye, not reaching the origin of the postmentals which reach base of pectorals.

Gill-openings extending to base of pectorals. Humeral process long and strong, naked; its surface more strongly granulated than the bones of the head. Pectoral pore moderate.

Lateral line almost straight, with two series of pores, each pore in the center of a white dot.

Distance of the dorsal spine from snout $2\frac{6}{7}$ in the length; the spine scarcely shorter than the head, its sides striate, its anterior margin serrate, its posterior margin roughened; the first soft ray higher than the spine. Distance between the dorsal and adipose fins $2\frac{1}{3}$ in the length.

Caudal fin slightly emarginate, the upper lobe somewhat longer, about 4 in the length. Anal fin low. Ventrals fins broad and short, $1\frac{1}{2}$ in the head.

Pectoral spine compressed, serrate on both margins, longer than the dorsal spine.

Color dark brown; fins all more or less dusky, margin of caudal and anal lighter; ventral surface white; chin dark brown.

Head $4\frac{1}{2}$; depth 5; D. I, 6; A. 21; V. 10; P. I, 8.

Two specimens, .07–.18 m. Maues, Rio Madeiro; Cameta. Agassiz. The description has been taken from the larger specimen.

L. FELICHTHYS.

Felichthys Swainson, Fish. Amph. & Rept. ii, 305, 1839 (sp).

Felichthys Swain, Proc. Acad. Nat. Sci. Phila. 281, 1882 (*nodosus*).

Pseudauchenipterus Bleeker, Nederl. Tijdschr. Dierk. i, 88, 1863 (*nodosus*).

Type: *Silurus nodosus* Bloch.

The forked caudal and emarginate anal, combined with other characteristics, seem to us to be of generic value, especially as species besides *nodosus* have been discovered with the same combinations.

Barbels six, mental barbels disposed in two pairs. Teeth villiform, none on the vomer or palate. Eye large, lateral, covered with skin. Adipose fin very short. Dorsal fin with a spine and six rays. Anal rather long, emarginate, the anterior rays in the male elongate bearing the urogenital tube. Ventral fins free, of eight rays. Pectoral spine strong, serrated on its inner margin; humeral process large. Occipital process firmly joined to the dorsal plate. Gill-membranes confluent with the skin of the isthmus. Bones of the head thick, mostly covered with skin. Head narrow, compressed, strongly convex transversely, its depth equal to or greater than its width. Pectoral pore present.

Habitat: Mouths of rivers from Jequitinhonha to Guiana.

ANALYSIS OF THE SPECIES OF FELICHTHYS.

a. Frontal bones not swollen or honeycomb-like; postorbital portion of the head covered with loose skin.
  b. Sides of body immaculate; upper caudal lobe dusky.
    c. Mental barbels about as long as diameter of eye; snout somewhat pointed, its greatest width less than half length of head; humeral process smooth. *jequitinhonhæ* 227.
    cc. Mental barbels reaching base of pectoral; snout bluntish, its greatest width 2 in the head; dorsal surface brown, a triangular spot behind eye and the opercle yellow; sides and ventral surface yellow; upper caudal lobe dusky, otherwise fins plain (in spirits). *flavescens* 228.
  bb. Sides of body thickly covered with brown dots, caudal dusky; mental barbels reaching about to base of pectoral; width of snout 1⅓ in head. *affinis* 229.
aa. Frontal bones swollen and of honeycomb structure; postorbital portion of head granular, covered with very thin skin *nodosus* 230.

227. Felichthys jequitinhonhæ.

Auchenipterus jequitinhonhæ Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische Südostl. Bras. iii, 89, pl. vi, fig. 1, 1*a* (Rio Jequitinhonha).

Felichthys jequitinhonhæ Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 152, 1888 (Jequitinhonha).

Habitat: Jequitinhonha.

Elongate, compressed, the depth everywhere much greater than the width. Head somewhat pointed, its greatest width 1⅗ in its length; its width at the rictus more than 2; its depth at base of occipital process greater than its width, about 1⅑ in the length; transverse profile of posterior part of the head strongly arched; the head everywhere covered with loose skin, the surface of the bones not exposed; frontal bones not swollen nor honeycombed; frontal fontanel open in front, extending backward to the center of the eye. Dorsal plate much as in *nodosus*, its posterior pocess extending a little farther back than in *nodosus*.

Eye oval, its anterior margin in front of the rictus, 3½ in the head, 1⅗ in the interocular, its diameter greater than the length of the snout.

Maxillary barbel scarcely reaching to the middle of the pectoral; mental barbel about as long as the eye, postmental not reaching base of pectoral.

Snout narrow, rounded; lower jaw included; teeth all villiform, the intermaxillary band strongly arched, its depth about 7 in its width.

Gill-opening extending to the base of the pectoral fin. Humeral process smooth, about reaching middle of pectoral spine. Pectoral pore rather large, round.

Lateral line undulating.

Distance of the dorsal spine from snout 3⅓–3⅕ in the length; dorsal spine 1¼–1⅖ in the head, its outer margin scarcely roughened, its inner margin with short teeth; first soft ray higher than the spine. Distance between dorsal and adipose fins 2¾–2⅗ in the length.

Caudal fin deeply forked, the lobes pointed, 3¼ in the length.

Anal fin emarginate, the tips of the anterior rays in the ♀ not reaching base of last; in the ♂ reaching beyond the last ray.

Ventral fins not reaching the anal, 2 in the head.

Pectoral spine 1¼ in the head, the outer margin and sides smooth, the inner margin strongly serrate.

Top of head with two series of four pores each, the second pore in both series situated between the posterior nares; the four posterior pores marking a rhomboidal figure; other pores on sides of head and humeral region.

Back and top of head light brown; back without distinct spots, the sides abruptly lighter; humeral region with numerous brown dots; upper caudal lobe and two spots on base of caudal fin brownish.

Head 4½–4¼; depth 5–6; D. I, 6; A. 17–19; V. 8; P. I, 7.

Three specimens .10–.11 m. Jequitinhonha. Hartt and Copeland.

228. Felichthys flavescens.

Felichthys flavescens Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 152, 1888 (Rio San Francisco).

Habitat: Rio San Francisco.

Elongate compressed, tapering rapidly to a slender caudal peduncle; depth everywhere much greater than the width. Head short and deep, its greatest depth little more than its greatest width which is 1½ in the length of the head; width at the rictus 2; head covered with loose skin, the surface of the bones not evident; frontal bones not swollen nor honeycomb-like; frontal fontanel open in front, extending backward to about the center of the eye. Occipital process 3 times as broad as long. Dorsal plate very widely forked in front, its width at the narrowest place more than twice its length on a median line; the posterior portion of the head strongly convex in a transverse section. Four pores on the snout, no conspicuous pores on sides or top of head.

Eye longer than snout, 3½ in the head, 1¾ in the interocular.

Maxillary barbel reaching to near tip of pectoral;

mental barbel to base of pectoral, postmental a little beyond its base.

Snout rounded, upper jaw longer; teeth all villiform, arranged as in *jequitinhonhæ*.

Gill-opening extending to base of pectoral. Humeral process covered with thin skin, somewhat roughened on its surface, extending a little beyond middle of pectoral. Pectoral pore large. Lateral line undulating.

Distance of dorsal spine from snout $3\frac{1}{5}$ in the length; dorsal spine $1\frac{1}{2}$ in the head, its outer margin scarcely roughened, its inner margin slightly serrate; first soft ray $1\frac{2}{5}$ in the head. Distance between dorsal and adipose fins $2\frac{1}{2}$ in the length.

Caudal deeply forked, the lobes pointed, $3\frac{3}{5}$ in the length.

Anal emarginate, the first rays (female) not reaching to base of the last rays.

Ventrals not reaching the anal, $1\frac{3}{4}$ in the head.

Pectoral spine slightly shorter than the head, its outer edge and sides smooth, its inner margin strongly serrate.

Back brown, the color composed of numerous brown dots; top of head and snout blotched with brown on a yellow ground; opercle and triangular spot behind the eye yellow; humeral region covered with numerous conspicuous brown dots; sides and ventral surface yellow; upper caudal lobe dusky, otherwise fins plain yellow.

Head $4\frac{1}{3}$; depth $5\frac{1}{4}$; D. I, 6; A. 20; V. 8; P. I, 6–7.

229. Felichthys affinis.

Auchenipterus affinis Steindachner, Süsswasserfische Südostl. Bras. iii, 93, 1876 (Rio Sao Matheos; Rio Mucury, near Porto Alegre).

Felichthys affinis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 154, 1888 (Para; Sao Matheos).

Habitat: Mouths of the streams draining the eastern part of Minas Geraes; Para.

Body elongate compressed, depth much greater than the width. Head short and blunt, its greatest depth about equal to its width, which is 1⅓ in its length; width at rictus 1⅘. Top of head with pores as in *jequitinhonhæ*. Sutures distinct.

Maxillary barbels variable, about reaching tip of pectorals; mental barbel reaching to the second third of the pectoral; postmental beyond middle of pectoral; all the barbels somewhat shorter in the largest specimens.

Inter-dorsal space 2½–2⅓ in the length.

First anal ray, in the ♂, greatly lengthened, the urogenital canal at its tip with a bladder-like expansion.

Dark brown, the color of the dorsal surface darker and uniform; on the sides lighter, composed of rather large brown dots; ventral surface white; numerous dark dots on the basal half of the dorsal fin; adipose fin dotted; caudal fin dusky; basal half of the anal, and basal half of the inner surfaces of the pectoral and ventral fins sparingly dotted.

Head 4⅓–4¼; depth 5; D. I, 6; A. 21; V. 8; P. I, 6.

In other respects this species agrees with the description of *Felichthys flavescens*.

Seven specimens; lengths .10–.12 m. Sao Matheos. Hartt & Copeland. Two specimens .13 m. Para. Agassiz and Bourget.

230. Felichthys nodosus.

Silurus nodosus Bloch, Ausländische Fische, part 8, 35, pl. 368, fig. 1, 1794 (Trauquebar); Bloch & Schueider, "Syst. Ichthyol. 383, 1801."

Arius nodosus Cuv. & Val. Hist Nat. Poiss. xv, 70, 1840 (copied).

Auchenipterus nodosus Müller & Troschel, Horæ Ichthyol. iii, 11, 1849 (?); Kner, SB. Ak. Wien, xxvi, 424, 1857 (Surinam); Günther, Cat. Fish. Brit. Mus. v, 194, 1864 (British, Dutch, and French Guiana).

Pseudauchenipterus nodosus Bleeker, Nederl. Tijdschr. Dierkunde, i, 88, 1863 (name only); id. Silures de Suriname, 43, pl. xi, fig. 1, pl. xiii, fig. 6, 1864 (Surinam).

Felichthys nodosus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 154, 1888 (Para; Bahia).
Auchenipterus furcatus Cuv. & Val. l. c., 211, 1840 (Guiana).
Habitat: Bahia; Para; Guiana.

Müller & Troschel on examination of Bloch's type identify *Au. furcatus* C. & V. with *Silurus nodosus* Bloch.

There is great variation in the length of the spines in this species; in a specimen from Bahia the pectoral spines end in a sharp point, and are very long; in the specimens from Para the spines are short and end abruptly, but are prolonged in a filament.

Elongate, slightly compressed; depth everywhere a little greater than the width. Head short, robust, its greatest width 1¼ in its length; its width at the rictus 1¾–1⅝; its depth at the base of the occipital process 1¼–1⅛. Bones of the skull covered with exceedingly thin skin, their surfaces finely striate and granular; frontal bones swoolen and deeply honeycombed. Frontal fontanel open in front. Occipital process parabolic behind, firmly joined to the dorsal plate. Dorsal plate emarginate behind, sending two long, curved processes backward to below the dorsal spine where they are curved downward and slightly forward. Sutures distinct.

Eye moderate, situated immediately above and behind the angle of the mouth; its diameter 1 in snout, 4–4½ in head, 2½ in the interocular.

Maxillary barbel reaching to the middle of the pectoral or further; mental barbels little beyond base of pectorals, postmentals inserted slightly posterior to the rictus and extending about as far as the barbels of the maxillaries.

Snout broad, rounded in front; jaws subequal, the lower a little the shorter; teeth all villiform, those on the intermaxillaries forming a curved band of uniform depth throughout, its depth being about one-seventh of its width.

Gill-opening extending to base of pectoral. Gill-rakers very short, 6+16. Humeral process striate or slightly granular, not extending to the middle of the pectoral spine; pectoral pore present.

Lateral line undulating, having very short lateral branches.

Distance of dorsal spine from snout 2¾–3 in the length; dorsal spine as long as or longer than the head, sometimes greatly swollen at its base, its outer margin roughened, its inner margin with short teeth; first soft ray little longer than the spine. Distance between dorsal and adipose fins 2¾–2⅘ in the length. Adipose fin short.

Caudal fin deeply forked, the lobes subequal, pointed, 3–3⅖ in the length.

Anal fin emarginate, the tips of the first rays in the ♀ not reaching the base of the last.

Ventrals not or scarcely reaching the anal, 1¾–2 in the head.

Pectoral spine very long and strong, 2⅔–3⅓ in the length, its sides and outer margin striate, its inner margin strongly serrate, little longer than the dorsal spine; first soft ray not as high as the spine.

Dorsal surface coffee colored, the sides abruptly lighter, humeral region thickly covered with large brown dots; fins all plain yellowish.

Head 4–4⅓; depth 5; D. I, 6; A. 20; V. 8; P. I, 8.

Three specimens .13–.145 m. Para; Bahia. Agassiz and Bourget.

LI. EPAPTERUS.

Epapterus Cope, Proc. Am. Philos. Soc. xvii, 677, 1878 (*dispilurus*).

Type: *Epapterus dispilurus* Cope.

Adipose fin none; teeth none; dorsal fin rudimentary, composed of a pungent spine and 3 soft rays; inner rays of ventrals connected. Ventrals far behind the dorsal, with 14 rays; anal long. Postcoracoid process ending in a sharp point behind. Barbels 6; gill-membrane joined to the isthmus. Humeral process present.

231. Epapterus dispilurus.

Epapterus dispilurus Cope, Am. Philos. Soc. xvii, 1878, 677 (Peruvian Amazon); Steindachner, Flussfische Südamerikas, iv, 31, 1882 (Hyavary); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 152, 1888 (Hyavary).

Evanemus longipinnis (Agassiz) Steindachner, Flussfische Südamerikas, iii, 17, 1881 (Hyavara).

Habitat: Upper Amazons.

Elongate, strongly compressed; ventral outline almost straight, dorsal outline gently arched. Head short, its greatest depth a little less than its greatest width, which is 1⅖ in its length; surface of the bones roughened, covered with thin skin. Frontal fontanel continued to the occipital. Occipital process more than twice as broad as long, rounded behind and joined to the dorsal plate. Sides and anterior edge of dorsal plate emarginate, widely forked behind; the forks projecting far beyond the dorsal fin, and longer than the rest of the plate.

Eye large, lateral, 1 in snout, 3 in head, 1½ in interocular.

Barbels reaching to beginning of ventrals; jaws subequal, width of mouth 1½ in width of head at the rictus.

Gill-rakers long and slender, 13+23. Pectoral pore present. Lateral line zig-zag, with numerous branches.

Distance of dorsal fin from snout 5 in the length; the spine little longer than the pupil.

Caudal fin emarginate, 5 in the length.

Anal fin very long, the distance of its origin from snout 2½ in the length.

Ventrals reaching far beyond origin of anal, one-fourth longer than head.

Pectoral spine strong, reaching ventral fins, its sides and outer margin smooth, its inner margin serrate, 1⅓ in head.

Color purplish, back darker than below; head, nape, and humeral region with round dark dots; a dark spot in center of each caudal lobe, inner surface of pectorals dotted.

Head $5\frac{4}{5}$; depth above first anal ray 5; D. I, 3; A. 61.

No. 9834, four specimens .086–.13 m.

Types of *E. longipinnis* Steind. Hyavary. Bourget.

LII. AUCHENIPTERUS.

Auchenipterus Cuv. & Val., Hist. Nat. Poiss. xv, 207, 1840 (*nuchalis*).

Evanemus Müller & Troschel, Hor. Ichthyol. iii, 11, 1849 (*colymbetes* = *nuchalis*).

Type: *Hypophthalmus nuchalis* Spix.

As Cuvier & Valenciennes clearly indicate *nuchalis*[*] to be the type of *Auchenipterus*, the later name *Evanemus* should not be substituted.

Barbels six, two on the maxillaries, four on the chin, inserted close behind the lip and in a line parallel with its margin. Adipose fin short. Dorsal fin with a spine and 6 rays. Anal fin long. Ventral fins posterior to the dorsal fin, each with 12–15 rays, broadly joined to the belly or connected together. Bones of the head rather thick, covered with skin. Occipital process parabolic behind, meeting the dorsal plate. Postcoracoid process ending in a sharp point. Teeth villiform; palate edentulous. Gill-membranes confluent with the skin of the isthmus. Humeral process present, usually concealed under the skin. Lateral line zig-zag, with numerous branches.

Habitat: Amazon; Surinam.

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[*] La position très-avancée de sa première dorsale, qui lui avait valu de la part de M. Spix l'épithète de *nuchalis*, nous à suggéré son nom générique *Auchenipterus*. C. & V. xv, 207.

ANALYSIS OF THE SPECIES OF AUCHENIPTERUS.

a. Humeral process covered with skin; ventrals reaching the anal; A. 42-49.

b. Mental and postmental barbels reaching little beyond middle of pectorals. Distance of dorsal fin from snout 4-4⅕ in the length; tip of ventrals reaching 2d or 3d anal ray; pectoral spine not reaching the ventrals, 1¾-1⅙ in head. *nuchalis* 232.

bb. Mental barbels reaching middle of ventrals, postmentals not to middle of pectorals. Distance of dorsal from snout about 3½ in the length; tip of ventrals reaching 8th or 9th anal ray; pectoral spine 1 in head, reaching beyond base of ventral fins. *fordicei* 233.

aa. Humeral process naked; ventrals not reaching the anal. A. 37. Eye 3 in head, interocular space 1⅔ in head. Dorsal spine 1⅓ in head, weakly serrated behind, smooth in front. Pectoral spine strongly serrate behind, smooth in front, as long as the head, not reaching the ventrals. Maxillary barbels reaching tip of pectoral spine, mentals to its base. Head 4⅓; depth above first anal ray, 6; D. I, 7; A. 37; V. 14. (Cope.) *brachyurus* 234.

232. Auchenipterus nuchalis.

Hypophthalmus nuchalis Spix, Gen. et Spec, Pisc. Bras. 17, pl. 17, 1829 (Brazil).

Auchenipterus nuchalis Cuv. & Val. Hist. Nat. Poiss. xv, 207, 1840; Castelnau, Anim. l'Amér. du Sud, 47, 1855 (Amazon); Kner, SB. Ak. Wien, xxvi, 422, 1857; Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 151, 1888 (Villa Bella).

Euanemus nuchalis Günther, Cat. Fish. Brit. Mus. v, 193, 1864 (River Capin, Para); Cope, Proc. Am. Philos. Soc. xvii, 676, 1878 (Peruvian Amazon); Vaillant, Bull. Soc. Philom. Ser. 7, iv, 1880 (Calderon).

Auchenipterus dentatus Cuv. & Val. l. c., 210 (Cayenne).

Evanemus colymbetes Müller & Troschel, Horæ Ichthyol. iii, 11, pl. i, fig. 2, 1849 (Surinam).

Habitat: Amazons; Surinam.

The description of *colymbetes* agrees with our specimens of *nuchalis*. The plate, however, is somewhat askew, not agreeing with the description.

Elongate compressed. Head short, its greatest width equal to snout plus the eye; at the base of the occipital process the depth equals the width; head entirely covered with thin skin; dorsal plate deeply emarginate in front and behind, less so on sides, its length on a median line 5 in the diameter of the eye.

Eye 1 in snout, $3\frac{2}{5}$ in head, about 2 in interocular.

Maxillary barbels reaching to tip of pectorals, their osseous base reaching beyond center of eye; mental and postmental barbels extending little beyond middle of pectorals. Snout rounded in front; jaws about equal; teeth all villiform, in a very narrow band in each jaw, intermaxillary band deepest on the sides, mandibulary band deepest in front, tapering to a point behind. Vomer with an indistinct patch of granular teeth.

Distance of dorsal spine from the snout 4–$4\frac{1}{3}$ in the length; dorsal spine slender, $1\frac{3}{5}$ in the head, its tip reaching the vertical from the base of ventrals, its anterior margin roughened or smooth, its posterior margin with short, wide set teeth. Distance of adipose from the dorsal fin $1\frac{4}{5}$ in the length, the adipose fin very small.

Caudal deeply lunate, about 5 in the length.

Origin of anal a little nearer tip of snout than to base of the caudal fin.

Ventrals extending to the 2d or 3d anal ray, $1\frac{2}{3}$–$1\frac{1}{6}$ in the head.

Pectoral spine short, stout in one specimen longer than the longest rays, shorter in the other, $1\frac{1}{4}$–$1\frac{1}{3}$ in head, not reaching to base of ventral fin, its outer margin smooth, its inner margin with sharp teeth.

Lateral line zig-zag, branching.

Pectoral pore small. Humeral process concealed beneath the skin.

Plain light on sides and ventral region, the back and top of head punctate with brown; a dark spot on upper part of opercle extends forward across interorbital region as a broad streak; a dark bar across the occipital process connects a dark blotch on either side below the dorsal plate; dark streaks or bars connecting anterior and posterior nares; inner surface of pectorals dark brown; tips of caudal dusky, other fins plain light.

Head 5½; depth, at dorsal spine, 6½–7; greatest depth 4¾–5; D. I, 6; A. 47; V. 12–15.

Two specimens .165 m. Villa Bella .15 m. loc. ?

233. Auchenipterus fordicei.

Auchenipterus fordicei Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 151, 1888 (Coary).

Body short, deep, compressed. Head short, its width equals the distance from tip of snout to middle of opercle; depth at base of occipital process little less than its width; top of the head covered with very thin skin, the surface of the bones striate. Occipital process twice as broad as long, parabolic behind, joining the dorsal plate; dorsal plate deeply emarginate in front and behind, less so on sides, its length on a median line 2½ in the diameter of the eye.

Eye 1 in snout, 3⅕ in head, 2⅓ in interocular.

Maxillary barbel reaching beyond base of ventral, its osseous base not extending to center of eye; mental barbels reaching *to the middle of the ventrals;* postmentals not to the middle of the pectorals. Snout rounded in front, jaws about equal, the width of the mouth at the rictus 1⅗ in the width of the snout at the same place.

Teeth as in *A. nuchalis.*

Distance of dorsal spine from the snout 3½ in the length; dorsal spine 1¼ in head, slender, its anterior margin smooth, its posterior margin with short teeth; its tip, when depressed, reaching the vertical from the end of the first third of the ventrals.

Caudal fin 4⅔ in the length.

Origin of anal equidistant between snout and base of caudal.

Ventrals large, ⅙ longer than head, the inner rays connected by a membrane, the tips of the longest rays reaching to the 8th or 9th anal ray.

Pectoral spine long and slender, 1 in head, curved, reaching a little beyond origin of ventrals, the outer edge smooth, the inner with sharp recurved teeth.

Pectoral pore large.

Nearly plain, the back somewhat darker than below, the inner rays of pectoral and ventral fins dusky; tips of the anterior rays of the anal dusky; fins otherwise plain light.

Head 5; depth at dorsal spine 5; greatest depth $4\frac{3}{5}$; D. I, 6; A. 46; V. 13–14.

Type No. 7289, one specimen, length .12 m. Coary. L. Agassiz.

234. Auchenipterus brachyurus.

Euanemus brachyurus Cope, Proc. Am. Philos. Soc. xvii, 676, 1878 (Peru).

Auchenipterus brachyurus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 152, 1888 (name only).

This species is known only from the types.

LIII. TETRANEMATICHTHYS.

Tetranematichthys Bleeker, Nederl. Tijdschrift, Dierkunde, i, 108, 1863 (*quadrifilis*).

Type: *Ageneiosus quadrifilis* Kner.

Barbels four, two below the angle of the mouth; top of head granular, without covering; air bladder without bony covering; otherwise as *Ageneiosus*.

235. Tetranematichthys quadrifilis.

Ageneiosus quadrifilis Kner, SB. Ak. Wien, xxvi, 442, 1857, pl. ix, fig. 29 (Rio Guaporé).

Tetranematichthys quadrifilis Günther, Cat. Fish. Brit. Mus. v, 193, 1864 (copied).

Snout semicircular; upper jaw scarcely projecting; the mandibulary barbels extending to below the eye; eye small. Pectoral spine shorter than the dorsal spine; caudal truncate. Lateral line simple. Uniform brown. Head $3\frac{1}{3}$; depth 4; D. I, 6; A. 41; V. 7. (Kner.)

SUBFAMILY AGENEIOSINÆ.

LIV. AGENEIOSUS.

Ageneiosus Lacépède, Hist. Nat. Poiss, v, 132, 1805 (*armatus*).

Ceratorhynchus Agassiz.

Hypophthalmus Schomburgk, Fish. Brit. Guiana, 191, 1849 (*dawalla*).

Pseudageneiosus Bleeker, Nederl. Tijdschr. Dierk. i, 1863 (*brevifilis*).

Davalla Bleeker, l. c. (*davalla*).

Ageniosus Günther, Cat. Fish. Brit. Mus. v, 191, 1864 (sp).

Type: *Ageneiosus armatus* Lacépède.

Barbels at the maxillaries only. Teeth villiform, none on the palate. Eyes large, lateral. Orbit without a free margin. Adipose fin very short; dorsal fin of a weak spine and 6 or 7 rays. Anal long. Ventrals behind the dorsal, with 7 or 8 rays, the inner one joined to the sides for at least half its length. Bases of pectorals more or less horizontal. Humeral process none. Lateral line zigzag, with numerous branches. Occipital process firmly joined to the dorsal plate. Gill-membranes confluent with the skin of the isthmus. Bones of the head thin, covered with thin skin.

Habitat: La Plata, and its tributaries; Paranahyba northward to Guiana and westward to Peru.

DOUBTFUL SPECIES.

235.1. *Silurus inermis* Linnæus, Syst. Nat. ed. xii, 503, 1766 (Surinam); Bloch, Ausländ. Fische, pt. 8, pl. 363, 1794. *Ageneiosus inermis* Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 149, 1888 (name only).

ANALYSIS OF THE SPECIES OF AGENEIOSUS.

a. Caudal forked. (AGENEIOSUS.)

b. Snout short, scarcely if any longer than the eye; anal rays about 30; branchiostegals 8.

c. Maxillary barbel not extending beyond the rictus, the basal portion fleshy; profile strongly concave, the postorbital portion of the head steep. Nearly plain; brown dots on head, back, and base of dorsal fin. *brevis* 236.

cc. Maxillary barbel extending beyond the rictus, the basal portion spinous; profile almost straight, scarcely descending. Back purplish; top of head with purplish dots, smaller points above the anal; an indistinct dark lateral band; all the fins punctulate; lips black. *atronasus* 237.

bb. Snout long and pointed, much longer than the eye; branchiostegals usually 10–11.

d. Maxillaries terminating in a branched spiny process which projects beyond the anterior margin of the eye; dorsal spines strong, strong hooks on its anterior margin.

e. Upper jaw projecting beyond the lower *valenciennesi* 238.

ee. Lower jaw projecting beyond the upper. *armatus* 239.

dd. Maxillaries terminating in a fleshy barbel.

f. Head 3⅓–4½ in the length.

g. Posterior margin of the pectoral spine serrate, at least near its tip. D. I, 6.

h. Maxillary barbel reaching the rictus, its base osseous, sometimes with short spines along its upper margin. Dorsal spine very slender, longer than the pectoral spine; serrated on its anterior margin. Upper portion of the head, upper half of the body and caudal yellowish, thickly spotted and marbled with dark violet. Eye 3¾ in the snout, 8 in head. Head 3⅓–4; depth 5½;–4½. D. I, 6; A. 39–41. (Steindachner.) *caucanus* 240.

hh. Maxillary barbel not reaching the rictus, ventrals about reaching the anal. Br. 10–11.

i. Depth of the intermaxillary band of teeth in front equals a diameter of the eye; snout long and pointed. Dorsal surface dark blue, becoming abruptly pale on the sides. Head 3⅘–4. Eye 3½–4 in snout, 7½–8 in head. *ucayalensis* 241.

ii. Depth of the intermaxillary band of teeth scarcely more than half as wide as the eye; snout more or less rounded Head 4⅕–4⅖. Eye 2–3 in snout, 5–6 in head. *dentatus* 242.

gg. Posterior margin of the pectoral spine smooth. D. I, 7. Eye its own diameter behind the rictus. Maxillary barbel not attaining the rictus by its own length. Pectoral spine 3½ in head. Ventrals falling far short of anal. Dorsal spine slender, flexible, rugose in front. Dorsal surface irregularly marbled with brownish purple; an occellus above gill-opening. Head 3⅜; A. 44. *porphyreus* 343.

ff. Head 3 in the length, a third longer than broad; snout parabolic, the upper jaw longer. Maxillary barbel filiform, extending beyond anterior margin of the eye; gape of the mouth more than half the length of the head; eye 6 in head, less than 4 in interocular; spines smooth, slender, half as long as the fins. Grayish, with large spots. Br. 11; D. I, 6; A. 38. *davalla* 244.

aa. Caudal obliquely truncate. (PSEUDAGENEIOSUS).

j. Pectoral pore a small round opening; eye rather small, its diameter less than half its distance from posterior nostril. *brevifilis* 245.

jj. Pectoral pore wider than the anterior nostril and closed by a membrane perforated by many smaller foramina. Eye rather large, its diameter being two-thirds of its distance from posterior nostril. Width of head 1½ in its length; snout very obtuse. Anterior margin of eye nearer end of snout than to edge of opercle. Maxillary barbel not reaching the rictus. Dorsal spine less than half as long as the head. Sides with whitish bands; dorsal fin and upper side of pectoral with brown spots; basal half of caudal black. Head 3¼; D. I, 6; A. 38; V. 8. (Günther.) *axillaris* 246.

236. Ageneiosus brevis.

Ageniosus brevis Steindachner, Flussfische, Südam. iii, 16, 1881 (Amazon.)

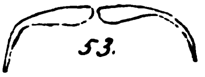
Ageneiosus brevis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i. 149, 1888 (Coary.)

Habitat: Solimoens.

Body short and deep, the depth everywhere greater than the width. Head short, depressed anteriorly, rising rapidly behind the eyes, the profile steep, concave; the head covered with skin, the surface of the bones longitudinally ridged; the greatest width of the head 1⅕ in its length, the width at rictus 1⅔; the snout broadly rounded in front. Fontanel short, not extending to posterior margin of eyes. Occipital process wider at base than its length, coössified with the dorsal plate.

Eye 1 in snout, 3½ in head, 2 in interocular space.

Maxillary barbel simple, minute, without perceptible bony base. Snout short, one-half interocular width. Cleft of mouth about 5 in the length of the head; upper



jaw everywhere narrowly produced. Intermaxillary band of teeth very shallow, scarcely ⅓ diameter of eye in front.

Gill-membranes confluent with the skin of the isthmus behind the eyes. Gill-rakers 8+13.

Lateral line somewhat zig-zag, branching.

Distance of dorsal fin from snout 2⅘ in the length; the spine 1½ in head, roughened in front, the basal third of the inner margin smooth, short teeth above. Distance between dorsal and adipose fins 2⅘ in the length; adipose fin high and short, half as long as the dorsal fin.

Caudal forked, the lobes pointed, the upper a little the longer, 1¼ in the head.

Origin of anal one-third nearer base of caudal than to the rictus. Ventrals reaching the anal, 2 in head.

Pectoral spine nearly smooth on outer margin, serrate on inner margin, the teeth introrse, its length 1¼ in the head.

Nearly plain; brown dots on head and back and on base of dorsal fin.

Head 3¾; depth, above origin of anal, 5; Br. 8; D. I, 6; A. 30.

One specimen .094 m. Coary. Professor Louis Agassiz.

237. Ageneiosus atronasus.

Ageneiosus atronasus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 149, 1888.

Habitat: ? Brazil.

Body as wide as deep under the dorsal spine. Head short, depressed, not much elevated behind the eyes, the profile nearly straight, much less steep than in *brevis*, the head covered with thin skin, the surface of the bones longitudinally ridged, the greatest width of the head 1⅓ in its length, width at rictus 1½; the snout as in *brevis*, broadly rounded in front. Fontanel short, ending over center of eye, but continuing as a groove backward as far as the posterior margin of the eye. Occipital process scarcely as long as its basal width, coössified with the dorsal plate, its surface ridges somewhat granular.

Eye 1 in snout, 3⅓ in head, 2 in interocular.

Bony portion of the maxillary barbel ⅔ its whole length, extending half its length beyond the rictus, its lower edge very minutely crenulate near its tip. Snout short as in *brevis*, about 2 in interocular. Upper jaw everywhere narrowly projecting, the intermaxillary band of teeth about as in *brevis*.

Lateral line zig-zag, with branches extending from the angles.

Distance of dorsal fin from snout 2⅔ in the length; the dorsal spine 1⅓ in head, roughened in front, short teeth on its inner margin except near base. Interdorsal space 2½ in the length; adipose fin high and short.

Caudal forked, the lobes pointed, 1 in the head.

Origin of anal ⅗ nearer base of caudal than to the rictus.

Ventrals reaching the anal 1⅘ in head.

Pectoral spine like that of *brevis*, except a little shorter, 1½ in the head.

Purplish on the back; head dotted above and below with purple; upper lip dark purple, the lower very narrowly margined; a rather obscure lateral band formed of dark dots; minute punctulations above the anal fin; all the fins more or less dotted with purplish, the caudal narrowly edged with that color.

Head 3⅗; depth, below dorsal, 6, above anal, 5; D. I, 6; A. 30.

One specimen .095 m. Exact locality unknown.

238. Ageneiosus valenciennesi.

Ageniosus militaris Valenciennes, Voy. d'Orbigny ix, atlas ii, pl. iv, fig. 1, 1847.

Ageneiosus militaris Cuv. & Val. Hist. Nat. Poiss. xv, 232, 1840 (La Plata; Buenos Ayres); Kner, SB. Ak. Wien, xxvi, 437, 1857 (Cujaba); Günther, Cat. Fish. Brit. Mus. v, 191, 1864 (copied).

Ageniosus valenciennesi Bleeker, Silures de Suriname 82, 1864 (based on Valenciennes l. c.); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 150, 1888 (Rio Puty).

Habitat: La Plata to Rio Puty.

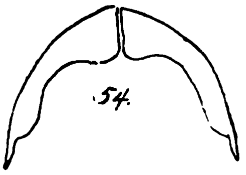
The specimens figured and described above are not identical with the specimen figured by Bloch. In this species the upper jaw projects considerably beyond the lower, while in the specimen figured by Bloch the upper jaw is shorter than the lower. Kner states that in his specimen the fulcrum of the dorsal spine is also provided with hooks; this is not the case with the single specimen examined by us.

Body elongate, compressed, the width 1⅓ in its depth. Head short, depressed, spatulate, the profile steep, concave. Occipital process short, fused with the dorsal plate, Y-shaped, the branches longer than the basal portion. Fontanel continued to the occipital process; bones of the skull striate, covered with thin skin; snout and sides of head with vermiculating mucous canals. Width of the head 1⅔, width at the rictus 1⅝; depth of head 2¾ in its length.

Eye strictly lateral, equidistant from tip of snout and margin of opercle, covered with skin which is thickened in front and behind; its diameter 6½ in the head, 3 in the interocular.

Maxillary barbel spinous, erectile, with numerous hook-like spines on its anterior margin at tip, reaching beyond the anterior margin of the eye.

Snout depressed, somewhat pointed, projecting beyond the lower jaw as far as ⅓ diameter of eye; intermaxillary



band of teeth deepest in front, tapering backward, the teeth villiform, depressible, the inner series several times as large as the outer; teeth of the mandible similar.

Gill-membranes confluent with the skin of the isthmus. Gill-rakers short, slender, 8+14.

Distance of dorsal spine from snout 3½ in the length. Dorsal spine strong, posterior margin smooth, its outer margin with strong hooks turned to right and left; first ray 1⅓ in the head; distance of the adipose from the dorsal fin 2 in the length. Adipose fin short and high.

Caudal fin forked, 5½ in the length.

Anal fin long, its origin equidistant between base of caudal and angle of mouth.

Ventral fins joined to the body on their inner margin, the first ray reaching origin of the anal fin, 1⅘ in head.

Base of pectorals horizontal, the spine 2⅐ in the head, slender, flexible, its outer margin smooth, its inner margin finely serrate, the longest ray 1⅗ in the head.

Light brownish, darker above.

Head 4; depth 6⅓; Br. 10; D. I, 6; A. 43; V. 7.

One specimen .30 m. Rio Puty; Orestes St. John.

239. Ageneiosus armatus.

Silurus militaris Bloch, Ausländische Fische, part 8, 19, pl. 362, 1794; Bloch & Schneider, "Syst. Ichthyol. 379, 1801" (not Linnæus).

Ageneiosus militaris Bleeker, Silures de Suriname, 80, 1864 (Surinam).

Auchenipterus militaris Steindachner, Fisch-fauna des Magdalenen Stromes, 19, 1878.

Ageneiosus armatus Lacépède, Hist. Nat. Poiss. v, 122, 1803 (Surinam).

Habitat: Surinam.

The combination *Silurus militaris* is a synonym of *)steogeneiosus militaris* (Linnæus), and the name *militais* cannot be retained for this species.

Dr. Bleeker examined a specimen in the Leyden Museum from Surinam, which he said was the species figured by Bloch. He also says that it is a true *Ageneiosus*, and the assumption of Dr. Steindachner, that Bloch overlooked the mental barbels in his dried (?) specimen, seems unwaranted.

The species is marked by its long lower jaw and by the long dorsal spine, which is provided with two groups of hooks on its outer margin.

240. Ageneiosus caucanus.

Ageneiosus caucanus Steindachner, Fisch-fauna des Cauca & Flüsse bei Guayaquil, 9, pl. vi, fig. 1-1*a*, 1879 (Cauca).

This species is known to us only from the description and plate by Dr. Steindachner.

241. Ageneiosus ucayalensis.

Ageneiosus ucayalensis Castelnau, Anim, Am. Sud. 49, pl. xvii, fig 2, 1855 (Ucayale); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 150, 1888 (Para).

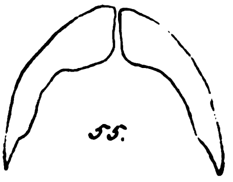
Habitat: Amazon at Para; Ucayale.

As the types of this species are said to have come from the Ucayale river, our specimens may be distinct from it.

Body elongate, about as high as wide in front of the ventrals, becoming strongly compressed behind the ventral fins. Head covered with skin, much depressed, the snout pointed, spatulate; the surface of the bones with longitudinal ridges. Fontanel continued backward as a groove to near the occipital process. Occipital process as broad as long, firmly joined to the dorsal plate. Width of the head little less than 2 in its length; width of the rictus scarcely less than the greatest width.

Eye lateral, 3½-4 in snout, 7½-8 in head, 3½ in the interocular.

Maxillary barbels simple, not reaching to the angle of



the mouth. Length of the snout greater than interocular width. Cleft of the mouth $2\frac{1}{3}$ in the head. Teeth as in *A. valenciennesi*, the depth of intermaxillary band in front equal to a diameter of the eye.

Gill-membranes confluent with the skin of the isthmus behind the eyes. Gill-rakers 5+12. Pectoral pore small.

Lateral line zig-zag, branching.

Distance of dorsal spine from the snout $3\frac{2}{5}$–$3\frac{1}{5}$ in the length; the spine 2–$2\frac{1}{5}$ in the head, slender, flexible, with small teeth on both margins. Distance between dorsal and adipose fins not quite 2 in the length; adipose fin high and short, half as long as the dorsal fin.

Caudal deeply forked, the lobes pointed, $4\frac{1}{2}$ in the length. Origin of the anal fin equidistant between base of caudal fin and the rictus, or the posterior margin of the eye.

Ventrals reaching the anal, 2 in head.

Pectoral spine smooth on its outer margin except near base, its inner margin serrate, much more slender than in *dentatus*, 2 in the head.

Dorsal surface very dark blue, becoming abruptly pale on the sides; base of caudal fin dusky; fins otherwise pale.

Head $3\frac{4}{5}$–4; depth, below dorsal, $7\frac{1}{3}$–$8\frac{1}{2}$; above anal $5\frac{3}{4}$; Br. 11; D. I, 6; A. 43.

Four specimens .26 m. long. Para. Agassiz & Bourget.

242. Ageneiosus dentatus.

Ageneiosus dentatus Kner, SB. Ak. Wien, xxvi, 441, 1857 (Surinam); Günther, Cat. Fish. Brit. Mus. v, 192, 1864 (Para).

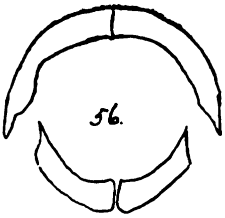
Ageneiosus pardalis Lütken, Vidensk. Meded. 190, 1874 (Caraccas); Steindachner, Fisch-fauna Magd. Stromes. 17, pl. iii, figs. 1–1*a*, 1878 (Magdalen River); Steindachner, Fisch-fauna des Cauca and Flüsse bei Guayaquil, 10, 1879 (Cauca); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 150, 1888 (Teffé; Para; Cameta).

Habitat: Amazon; Solimoens from Para to Teffé north to Guiana and Rio Magdalena.

Body elongate, compressed, the width, under the dorsal fin, 1¼ in the depth. Head depressed, covered with skin, the snout spatulate. Fontanel continued as a groove to the base of the occipital process. Occipital process joined to the dorsal plate; bones of the skull striate.

Eye lateral, 2–3 in snout, 5–6 in head, 3–3½ in the interocular.

Maxillary barbels simple, concealed, not reaching to the end of the intermaxillary bone. Teeth as in *A. valenciennesi*, the depth of intermaxillary band little more than half a diameter of the eye. Cleft of the mouth 2⅖–2⅗ in head. Length of snout about equal to interocular width.



56.

Gill-membranes confluent with the skin of the isthmus posterior to the eyes. Gill-rakers short, 7+14.

Pectoral pore small. Lateral line zig-zag, branching.

Distance of dorsal spine from snout 3⅖–3⅗ in the length; the spine slender, flexible, crenate in front, roughened near the tip behind, its length 2 in the head; distance between the adipose and dorsal fins less than 2 in the length. Adipose fin high and short, shorter than the dorsal fin. Caudal forked, 4½–5 in the length.

Origin of the anal fin slightly nearer the rictus than to base of the caudal.

Ventral fins 1½–2 in the head, reaching the anal fin.

Pectoral spine roughened on its outer margin, serrate on inner margin, long and slender, 1⅓–2 in the head.

Back purplish, top of head marbled with purplish and whitish; base of caudal purplish; otherwise plain light. In the young the color is more marked: the inner surfaces of the ventrals, and more especially the pectorals, covered with dark dots; tip of dorsal and caudal blackish; dorsal surface irregularly spotted with dark brown.

Head $4\frac{1}{4}$–$4\frac{2}{5}$; depth below dorsal 7–$7\frac{1}{2}$; above anal $5\frac{1}{4}$–$5\frac{3}{4}$; Br. 10; D. I. 6; A. 44.

The specimens examined measure .14–.25 m. Teffé; Para; Cameta. Agassiz & Bourget.

243. Ageneiosus porphyreus.

Ageneiosus porphyreus Cope, Trans. Am. Philos. Soc. xiii, 404, 1867 (Surinam).

Habitat: Surinam.

This species is known to us only from the description by Dr. Cope.

244. Ageneiosus dawalla.

Ageneiosus inermis Cuv. & Val. Hist. Nat. Poiss. xv, 240, plate 440, 1840 (Surinam) [not *Silurus inermis* Linn. or Bloch]; Castelnau Anim. Am. Sud. 48, 1855 (Amazon).

Hypophthalmus dawalla Schomburgk, Fisch. Brit. Guiana, 191, pl. 9, 1849 (Guiana).

Ageneiosus dawalla Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 150, 1888 (name only).

Ageniosus sebæ Günther, Cat. Fish. Brit. Mus. v, 192, 1864 (copied).

Habitat: Guiana; Amazon.

This species has not been examined by us. *H. dawalla* Schomburgk, evidently represents some species of *Ageneiosus;* in its proportions it agrees with *Ageneiosus inermis* Cuv. & Val., and as it came from the same locality, we may not be far wrong in identifying it with that species.

245. Ageneiosus brevifilis.

Ageneiosus brevifilis Cuv. & Val. Hist. Nat. Poiss. xv, 242, 1840 (Cayenne); Kner, SB. Ak. Wien, xxvi, 438, 1857 (Rio Cujaba); Günther, Cat. Fish. Brit. Mus. v, 192, 1864 (River Capin, Para); Günther, Proc. Zool. Soc. Lond. 229, 1868 (Xeberos); Cope, Proc. Am. Philos. Soc. xvii, 676, 1878 (Peruvian Amazon); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 150, 1888 (Serpa).

Pseudageneiosus brevifilis Bleeker. Silures des Suriname. 83, pl. xvi, fig. 1, 1864 (Surinam).

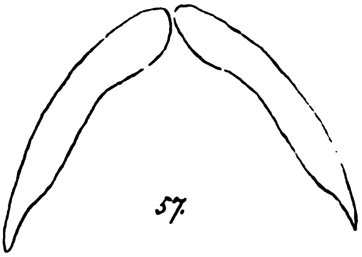
Habitat: Amazons; Guiana; Upper Paraguay.

Body robust, becoming compressed backward. Head broad and flat, the profile almost straight, not very oblique; width of head 1⅓–1¼ in its length, at the rictus 1⅖–1½; depth 2. Fontanel extending to base of occipital process. Occipital process coössified with the dorsal plate; the surface of the bones of the head striate, covered with skin; opercle emarginate, profusely branched ridges radiating from its angle.

Eye one-half its diameter behind the rictus, nearer posterior nares than margin of opercle, its diameter 3–4 in snout, 6–8 in head, 5–7 in interocular.

Maxillary barbel compressed at base, filiform at tip. Snout depressed, pointed, the upper jaw little projecting. Teeth cardiform, both bands interrupted in the middle.

Gill-membranes separate to in front of the eye. Gill-rakers short, spine-like, 6+18. Pectoral pore round, placed high. Lateral line zig-zag, with numerous branches.


57.

Distance of dorsal spine from snout 3–3⅓ in the length; the spine long and slender, 1⅘ in the head, measuring to end of ray, inconspicuously granular in front, smooth behind; distance of adipose fin from the dorsal fin 2¾ in the length, the fin higher than long, little shorter than the dorsal fin.

Caudal fin obliquely rounded, 6–8 in the length.

Origin of anal fin little nearer base of caudal than to the rictus.

Ventrals extending to or somewhat beyond origin of anal, about 2 in head.

Pectoral spine flexible, smooth on both margins, about 1½–2 in head.

Dorsal surface dark brown; sides, especially backward, mottled with darker, indistinctly striped; the fins in the largest specimen margined with black, a white band margining the black in the smallest specimen; dorsal fin, inner surfaces of pectoral and ventral fins finely mottled; a black axillary spot.

Head 3½; depth 5: Br. 10–11; D. I, 6; A. 34.

Two specimens .42–.50 m. Serpa; Villa Bella. Thayer Exped.

246. Ageneiosus axillaris.

Ageniosus axillaris Günther, Cat. Fish. Brit. Mus. v, 431, 1864 (Surinam).

Habitat: Surinam.

This species is known only from the types.

FAMILY IV. HYPOPHTHALMIDÆ.

=*Siluridæ anomalopteræ* Günther, Cat. Fish. Brit. Mus. v, 3, 1864.

=*Hypophthalmidæ* Cope, Proc. A. A. A. S. 1871.

This family composed of two genera, is confined to the northern Amazon and Guiana region of South America.

The anatomy of the family has been studied by Prof. R. Ramsay Wright. *

The characterization of the family is given in the key.

ANALYSIS OF THE GENERA OF HYPOPHTHALMIDÆ.

a. Jaws and vomer with teeth.	*Helogenes* lv.
aa. Jaws and vomer without teeth.	*Hypophthalmus* lvi.

LV. HELOGENES.

Helogenes Günther, Annals and Magazine Natural History, xii, 443, 1863 (*marmoratus*).

Type: *Helogenes marmoratus* Günther.

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* On the Skull and Auditory Organ of the Siluroid *Hypophthalmus*, Trans. Roy. Soc. Canada 1885, 107-118, plates viii-x.

This genus differs from *Hypophthalmus* in having a band of teeth in the jaws and two patches on the vomer.

Eye small, covered with skin, above the level of the angle of the mouth.

Adipose fin very small; dorsal fin very short, without pungent spine, inserted behind the ventrals; anal very long. Barbels six. No dermal bones.

Gill-membranes entirely separate; pectorals without spine; ventrals six-rayed. Branchiostegals 13.

247. Helogenes marmoratus.

Helogenes marmoratus Günther, l. c. (Essequibo); id. Cat. Fish. Brit. Mus. v, 66, 1864 (Essequibo).

Habitat: Essequibo River.

Head small, slightly depressed, short, two-thirds as broad as long. Snout broad, obtusely rounded; mouth of moderate width.

Body compressed, upper and lower profiles only slightly convex; a longitudinal groove from nape to origin of the dorsal.

Teeth minute, cardiform, forming bands in both jaws, the outer series containing somewhat larger and more widely set teeth; two patches of teeth on the vomer.

Barbels thin, and of nearly equal length, extending to, or nearly to, the middle of the pectoral fin; postmental barbels close behind the mentals and almost below the maxillary barbels.

Dorsal fin a little behind the middle between the nape and the caudal; its height shorter than head. Adipose fin very short. Caudal equally lobed; 5 in the length. Anal with fleshy base; extending to root of caudal. Pectoral equal to the head in length, extending beyond the base of the ventral fin; ventral fin extending slightly beyond origin of anal.

Blackish brown, finely marbled with black. Head $5\frac{1}{2}$; depth $4\frac{1}{3}$. Br. 13; D. 5; A. 42. (Günther.)

LVI. HYPOPHTHALMUS.

Hypophthalmus Spix, Pisc. Bras. 16, pl. 9, 1829. (sp.)

Hypophthalmus Bleeker, Nederl. Tijdschr. Dierkunde, i, 109, 1863 (*edentatus*).

Notophthalmus Hyrtle, Denk. Ak. Wien, xvi, 17, 1859 (*marginatus* = *edentatus*).

Pseudohypophthalmus Bleeker, l. c. (*fimbriatus* = *edentatus*).

Type: *Hypophthalmus edentatus* Spix.

No teeth in the jaws or on the vomer; eye situated behind and partly below the level of the angle of the mouth.

Adipose fin very small; dorsal fin short, with a slightly spinous ray, inserted behind the ventrals; anal long; intermaxillaries very small. Barbels six.

Gill-openings wide, extending nearly to the symphysis. Air-bladder rudimentary. Ventrals six-rayed. Branchiostegals 13 or 14. Gill-rakers long and slender; fourth gill-arch entirely free, the first two with a single series of gill-rakers and a broad membrane.

248. Hypophthalmus edentatus.

Hypopthalmus edentatus Spix. Pisc. Brasil. 16, pl. ix, 1829 (Equatorial Brazil); Günther, Cat. Fish. Brit. Mus. v, 67, 1864 (copied); Cope, Proc. Am. Philos. Soc. xvii, 673, 1878 (Peruvian Amazon); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 120, 1888 (Para).

Hypophthalmus marginatus Cuv. & Val. Hist. Nat. Poiss. xv, 225, plate 439, 1840 (Cayenne; Surinam); Günther, Cat. Fish. Brit. Mus. v, 68, 1864 (copied); Vaillant, Bull. Soc. Philom. Ser. 7, iv, 150, 1880 (Calderon); Wright, Trans. Roy. Soc. Can. iii, sect. iv, 107–118, plates 8–10 (important paper on structure).

Notophthalmus marginatus Hyrtle, Denk. Ak. Wien, xvi, 17, 1859 (vertebræ 2 + 5 + 54).

Hypophthalmus longifilis Cuv. & Val. l. c. xv, 230, 1840 (Surinam); Gunther, l. c. (Demarara; Surinam); Bleeker, Silures de Suriname, 88, 1864 (Surinam).

Hypophthalmus spixii Cuv. & Val. l. c. xv, 231, 1840 (copied); Kner, SB. Ak. Wien, xxvi, 446, 1857 (Rio Branco).

Hypopthalmus edentulus Castelnau, Anim. Amér. du Sud, 47, 1855 (Amazon).

Hypophthalmus fimbriatus Kner, l. c. 444, plate 9, fig. 30 (Rio Negro); Günther, l. c. (copied).

Hypophthalmus perporosus Cope, l. c. (Nauta); Steindachner, Flussfische Südamerika's, iv, 4, 1882 (Rio Huallaga; Rio Amazonas).

Habitat: Amazons and tributaries, and northward.

The species of *Hypophthalmus* are based chiefly on the variation of the barbels and the lateral pores. We have examined specimens from .12–.40 m. long. Some agree with one of the above quoted descriptions, and some with another. They are labeled *edentatus*, *fimbriatus*, and *longifilis*. There is little doubt but that the species have been based on the different stages of one species, as we shall endeavor to prove.

Steindachner had two specimens of *perporosus*, one of which had the pores of the lateral line and its branches much less evident than the other.

In some of the specimens examined by us the pores are not evident on a superficial examination, while in others they are so conspicuous as to attract the attention at once, and in the smallest specimen there are no pores except along the lateral line and at end of its very short branches.

The barbels in some appear filiform, but a closer inspection proves that all are margined more or less broadly. The smallest specimen has the membrane of the barbels very broad near the base; the maxillary barbel extends beyond tip of dorsal; mental and postmental barbels to the tip of the dorsal.

In a specimen .18 m. long the maxillary barbels reach the tip of the dorsal fin and the mental barbels extend to the anal fin.

In a specimen .40 m. long the maxillary and mental barbels reach the base of the pectoral, while Professor Cope says the specimen of .50 m. had the maxillary barbels extending past the base of the ventral fin and the mental barbels nearly to the opercular border.

H. longifilis was based on specimens of from .13–.15 m. in length and accordingly the maxillary barbels extend beyond the dorsal.

H. marginatus and *H. edentatus* were based on specimens .25–.35 m. long and the maxillary barbels are slightly longer than the head and not extending to the end of the pectoral.

We do not know the length of the type of *H. fimbriatus*.

This may be sufficient to prove that the different "species" of *Hypophthalmus* are different stages of the same species.

The nine specimens examined are from Pará.

Body much compressed; greatest width of head 2¼–3 in its length, its greatest depth 2⅓; profile straight and steep; mouth horizontal, placed low.

Eyes 9–13 in head, 5–6 in snout, 2½–4 in the space between the eyes measuring below.

A long groove from occiput widening forward.

Upper jaw thin, papery; no teeth.

Maxillary barbels inserted in front of anterior nares; reaching adipose fin in young, scarcely beyond head in adult examples; all the barbels flattened and having their posterior margins membranaceous, especially in the young; the mental and postmental barbels reaching to the tip of the dorsal in the young, shorter in the adult.

Gill-membranes separate to below the maxillary; gill-rakers slender, about two diameters of the eye in length, very numerous.

Lateral line prominent, sending branches downward and backward to below the level of the pectorals, and others backward and upward; each set of branches extending across the lateral line—the one upward and forward, the other forward and downward to the second branch in front of it, forming a network along each side of the lateral line; the branches becoming irregular on the tail, the line curving upward at base of the caudal fin; a series of pores extends on either side of the lateral line and its branches.

Dorsal fin short, the spine slender, 2½–3 in head, its insertion variable; adipose fin very small.

Caudal deeply forked, the lobes pointed.

Ventrals small, extending to the anal in the young, shorter in the adult.

Pectoral spine reaching to the anal, 2½ in length of head; shorter in the adult.

Color brassy or silvery, darker above; fins sometimes with a dark border.

Head 3¾–4½; depth 4½–5½; Br. 14; D. I, 6; A. 68.

Nine specimens, .12–40 m. Para. Thayer Expedition.

FAMILY V. PYGIDIIDÆ.

>*Siluroidei trichomycteriformes* Bleeker, Nederl. Tijdschr. Dierk. i, 112, 1863.

>*Siluridæ opisthopteræ* Günther, Cat. Fish. Brit. Mus. v, 4, 1864.

>*Siluridæ branchicolæ* Günther, l. c.

>*Trichomycteridæ* Gill, Arrangement of Families of Fishes, 19, 1872.

=*Pygidiidæ* E. & E. Am. Nat. July, '88.

Air bladder rudimentary, enclosed in the lateral processes of the coalesced vertebræ. Adipose fins none. Dorsal and anal short. Skull enveloped in a thick coat of muscles and skin. Teeth usually villiform. Nares remote. Derm naked.

The members of this family vary greatly. *Cetopsis* is the most aberrant of the genera, approaching most closely some genera of Auchenipterinæ, with which it has usually been associated. Its coalesced vertebræ and air bladder are, however, essentially like those of *Pygidium*. Its dorsal fin while placed well forward is not connected with the skull by any processes or bucklers, and except for its position is like that of *Nematogenys* and *Pygidium*.

ANALYSIS OF THE GENERA OF PYGIDIIDÆ.

a. Dorsal entirely in front of the ventrals; vomer with teeth; head compressed; anterior nares almost labial. Gill-membrane broadly united with the isthmus. Eye almost entirely concealed under the skin. A single maxillary barbel; two pairs of mental barbels. Opercles unarmed. (CETOPSINÆ.) CETOPSIS LVII.

aa. Dorsal above or behind the ventrals; no teeth on the vomer.

- *b*. Gill-openings broad, the gill-membranes almost free or forming a free membrane across the isthmus. (PYGIDINÆ.)
  - *c*. Anal short; eyes superior; mouth terminal; gill-membranes free or almost free from the isthmus.
    - *d*. Ventrals present.
      - *e*. A single maxillary barbel; opercle and preopercle unarmed.
        - *f*. Nasal barbels present; dorsal placed over the ventrals; one pair of mental barbels. NEMATOGENYS LVIII.
        - *ff*. Nasal barbels obsolete; dorsal placed behind the ventrals; two pairs of mental barbels. PARIOLIUS LIX.
      - *ee*. Two maxillary barbels; opercle and preopercle with osseous prickles; nasal barbels present. PYGIDIUM LX.
    - *dd*. Ventral fins none; otherwise like Pygidium. EREMOPHILUS LXI.
  - *cc*. Anal long, partly in front of the dorsal; head greatly depressed; eyes infringing on the upper and lower surfaces of the head; mouth inferior; gill-membranes broadly joined to each other, free from the isthmus; opercle and preopercle with osseous prickles; a series of fine labial teeth. TRIDENS LXII.
- *bb*. Gill-membranes confluent with the skin of the isthmus, the gill-opening a narrow slit in front of the pectoral; opercle and preopercle armed with spines; vent far behind the middle of the body; anal short. (STEGOPHILINÆ.)
  - *g*. Maxillary barbel single.
    - *h*. Teeth small, forming several series on each jaw; upper lip with two or more series of movable teeth; mouth inferior.
      - *i*. Caudal widely forked, the upper lobe produced in a filament. PSEUDOSTEGOPHILUS LXIII.
      - *ii*. Caudal rounded or slightly emarginate. STEGOPHILUS LXIV.
    - *hh*. Teeth comparatively large, pointed, forming a single series on the intermaxillaries only; mouth subinferior. VANDELLIA LXV.

gg. Maxillary barbels double.

j. Teeth broad incisor-like, in a single series on the jaws; caudal forked. PAREIODON LXVI.

jj. Teeth conical, in several series; caudal rounded. MICROGLANIS LXVII.

SUBFAMILY CETOPSINÆ.

LVII. CETOPSIS.

Cetopsis Agassiz, Gen. et Spec. Pisc. Bras. 11. (sp.)

Cetopsis Bleeker, Nederl. Tijdschr. Dierkunde, i, 111, 1863 (*cæcutiens*).

Hemicetopsis id. l. c. (*candiru*).

Pseudocetopsis id. l. c. (*gobioides*).

Type: *Silurus cæcutiens* Lichtenstein.

Barbels six, the mental barbels disposed as to pairs. Eyes rudimentary, covered with skin. Teeth villiform or compressed-conical or incisor-like, in a single series or in a band. Teeth on the vomer. No nasal barbels; caudal forked.

Habitat: Amazon and its tributaries; Guayaquil.

ANALYSIS OF THE SPECIES OF CETOPSIS.

a. Teeth all conical or incisor-like, those on the vomer in a single series. (HEMICETOPSIS).

b. Teeth on the mandible and on the intermaxillaries in a single series. Anterior nares 1¼ times as wide apart as the posterior; gill-openings entirely below the first pectoral ray; inner margin of the ventrals entirely free; pectorals reaching half way to the ventrals. *candiru* 249.

bb. Teeth on the intermaxillaries in 2 or 3 series, mandible with 2 series of teeth, anterior nares nearer together than the posterior; gill-opening as far above as below the first pectoral ray; inner ventral ray connected with the belly by a membrane. Distance of the dorsal spine from tip of snout 3 in the length; first dorsal ray as long as the head. Pectorals shorter than the head not quite reaching the ventrals. Caudal and dorsal dotted with dark, other fins plain; dorsal surface dark plumbeus, sides of body and head silvery white with irregular spots; lower parts silvery white. Head 4-4½; depth 5-6; D. I, 5; A. 26-27; P. I, 8; V. 6. (Steindachner). *plumbeus* 250.

aa. Teeth on the intermaxillaries villiform in a band; those on the vomer and on the mandible incisor-like, in a single series. (CETOPSIS.) *cæcutiens* 251.

aaa. Teeth on the intermaxillaries and on the mandible villiform, in bands, those on the vomer conical, in a single series. (PSEUDOCETOPSIS).

c. Eye moderately large, about 6 in the head; gill-opening as far above as below the pectoral. Distance of the first dorsal ray from tip of snout 3 in the length; ventral fins united by a membrane; pectoral fins reaching in the ♂ beyond the base of the ventrals. All fins immaculate. Head 5; dorsal 7; A. 22. (Kner.) *gobioides* 252.

aaaa. Teeth all villiform.

d. Teeth on the vomer in two patches; head 3¼. Ventrals behind the vertical from the last dorsal ray, the basal half of the inner margin joined to the ventral surface; posterior nares remote from each other. Eye 10¾ in the head. Barbels all short. Gill-opening extending above and below the pectoral fin. Distance of first dorsal ray from tip of snout 2⅗ in the length. Caudal somewhat forked; pectoral fin reaching ⅗ toward the base of the ventrals. Depth 4; D. I, 6; P. I, 9; V. I, 5; A. 29. (Steindachner). *occidentalis* 253.

dd. Teeth on the vomer in a single series; head 4¼; width of the head not more than half of its length; ventral fins connected by their inner margins to the ventral surface. Barbels all short. Grayish, darker above; basal half of the dorsal punctate with black. D. I, 6; A. 29; V. 6; P. 10. (Gill.) *ventralis* 254.

249. Cetopsis candiru.

Silurus candiru Spix. Gen. Spec. Pisc. 13, plate x, fig. 1, 1829 (Equatorial rivers of Brazil).

Cetopsis candiru Agassiz, Gen. Spec. Pisc. 13, 1829.

Cetopsis candira Cuv. & Val. Hist Nat. Poiss. xiv, 386, 1839 (copied); Günther, Cat. Fish. Brit. Mus. v, 199, 1864 (River Cupai); Cope, Proc. Am. Philos. Soc. xvii, 678, 1878 (Peruvian Amazon); Steindachner, Flussfische Südamerika's, iv, 5, 1882 (Rio Huallaga); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 157, 1888 (Tabatinga; Jutahy, Tonantins; Iça).

Habitat: Amazons and tributaries from the Rio Cupai to the Rio Huallaga).

Subterete, little compressed and scarcely tapering backward. Head short and thick, the bones everywhere covered with thick muscle; profile somewhat arched in front; the depth of the head a little less than the width; anterior nares 1½ times as wide apart as the posterior ones.

Eye small, but much larger than one of the posterior nares.

Barbels rather thick and short, at least partially receivable in grooves at their bases; all of about equal length; the mental barbels disposed as two pairs situated behind the rictus.

Mouth terminal, the upper jaw very slightly projecting; a single series of somewhat compressed teeth in each jaw and on the vomer; intermaxillaries each with 4 teeth; mandible with 8–12 teeth on each side; vomer with about 8 on each half.

Gill-openings very small, entirely below the first pectoral ray. Pectoral pore present; lateral line simple, straight.

Distance of first dorsal ray from tip of snout $3\frac{3}{5}$ in the length; the first dorsal ray scarcely higher than the second, the last half as high as the second ray.

Caudal narrow, emarginate, $5\frac{1}{2}$–$5\frac{4}{5}$ in the length.

Anal rays gradually decreasing backward, their tips projecting beyond the membrane.

Ventrals short, very narrow, the inner margins entirely free.

Pectorals reaching about half-way to the ventrals, $1\frac{1}{2}$ in the head.

Faintly dotted with light brown above; sides and below white, probably pink in life; pectoral and dorsal fins dark, their free half nearly black; free half of the ventrals dusky; other fins plain white.

Head 6; depth 6; D. 7: A. 30; V. 6; P. 9.

Seven specimens .10–.13 m. Tabatinga; Jutahy; Tonantins; Iça. Thayer Expedition.

250. Cetopsis plumbeus.

Cetopsis plumbeus Steindachner, Flussfische Südam. iv, 31, pl. vi, fig. 3, 1882 (Canelos); Boulenger, Proc. Zool. Soc. Lond. March, 1887, 276 (Canelos).

Habitat; Eastern slopes of Ecuador.

251. Cetopsis cœcutiens.

Silurus cæcutiens Lichtenstein, Wiedem. Zool. Mag. i, part 3, 61, 1829 (Brazil); Spix, Gen. et. Spec. Pisc. 12, pl. x, fig. 2, 1829 (Rivers of equatorial Brazil).

Cetopsis cœcutiens Agassiz, Gen. et. Spec. Pisc. 12, 1829; Cuv. & Val. xiv, 384, 1839 (copied); Kner, SB. Ak. Wien, xxvi, 409, 1858. Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 157, 1888 (Gurupa).

Cetopsis cœcutiens Günther, Cat. v, 199, 1864 (River Cupai, tributary to the Amazon, 800 miles from the sea).

Habitat: Lower Amazon; Gurupa to Rio Cupai.

Body heavy, little compressed, tapering rapidly to the caudal peduncle. Head bluntly conical, the bones everywhere covered with a thick layer of muscle. Profile arched, depth of the head considerably greater than its width. Anterior nares situated near the lip, four times as wide apart as the posterior nares which are large, oval, above the anterior margin of the eye.

Eye small, rudimentary, covered with skin, not larger than the posterior nares.

Maxillary barbels almost entirely concealed in a slit-like groove, 3½ in the length of the head. Mental and postmental barbels of about the same length disposed as two pairs behind the angle of the mouth, receivable in shallow grooves.

Mouth inferior, its width at the rictus 2⅓ in the head; a narrow band of fine villiform teeth on the intermaxillaries; mandible and vomer each with a single series of firmly set, thick compressed teeth.

Opercle with a broad membranaceous border. Gill-opening extending farther below than above the upper pectoral ray.

Pectoral pore an elongate slit; lateral line straight, simple.

Distance of dorsal spine from the snout 2½ in the length, first dorsal ray somewhat elongate, the rays rapidly decreasing in height backward, the last not a third as high as the second.

Caudal deeply emarginate, 4½ in the length.

Anal rays decreasing in height backward.

Ventrals short, with the basal half of their inner maggins attached to the belly.

First pectoral ray lengthened, reaching past the base of the ventrals, a little shorter than the head, its tip broken, probably longer than the head.

Dorsal surface grayish brown, becoming gray on sides, lighter below.

Head $3\frac{3}{5}$; depth 4; D. 7; A. 21; V. 6; P. 10.

One specimen, ♀, length .23 m. Gurupa. Louis Agassiz.

252. Cetopsis gobioides.

Cetopsis gobioides Kner, SB. Ak. Wien, xxvi, 407, 1857, pl. vi, fig, 16 (Irisanga); Günther, Cat. Fish. Brit. Mus. v, 199, 1864 (copied).

Silurus pygmæus Natterer in Kner. l. c.

Habitat: Irisanga.

This species is known only from the types.

253. Cetopsis occidentalis.

Cetopsis occidentalis Steindachner, Fisch-fauna des Cauca and Flüsse bei Guayaquil, 47, plate viii, fig. 2–2a, 1880 (Rivers near Guayaquil).

Habitat: Guayaquil.

This species is known only from the types.

254. Cetopsis ventralis.

Cetopsis ventralis Gill, Proc. Acad. Nat. Sci. Philad. 1870, 95 (Upper Amazon).

Habitat: Upper Amazon.

LVIII. NEMATOGENYS.

Nematogenys Girard, Proc. Acad. Nat. Sci. Phila. 1854, 198 (*inermis*).

Type: *Trichomycterus inermis* Guichenot.

Dorsal fin placed over the ventrals, without a spine. Fontanel extending to base of occipital process, interrupted above the posterior margin of orbit. Opercle and preopercle unarmed. A single barbel on each maxillary and one pair of mental barbels.

Habitat: Central Chile.

255. Nematogenys inermis.

Trichomycterus inermis Guichenot, in Gay Hist. Chil. Zool. ii, 312, pl. ix, fig 2, 1848 (Chile).

Nematogenys inermis Girard, U. S. Nav. & Astron. Exped. 240, pl. xxxii, 1855 (Rio de Maypu near Santiago); Philippi, MB. Ak. Berl. 716, 1866 (Chile); Günther, Cat. v, 272, 1864 (copied); E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 50, 1889 (Curico; Santiago).

Nematogenys nigricans Philippi, l. c. 716 (Chile).

Nematogenys pallidus Philippi, l. c. 716 (Chile).

Habitat: Fresh waters of Central Chile.

N. nigricans and *pallidus* seem to be color varieties of *N. inermis.*

Tail compressed, head depressed, the caudal peduncle about as deep as the body. Head entirely covered with soft skin, little longer than wide, its depth 1$\frac{3}{5}$–2 in its length. Eye small, superior; interocular width little less than length of snout; orbit without a free margin. Mouth wide, terminal, each jaw with a rather deep band of villiform teeth.

Gill-membranes narrowly joined to the isthmus.

Anterior nasal opening with a barbel which is about 1$\frac{1}{2}$ times as long as the eye; a series of pores extending from it backward below the eye; a prominent pair of pores between the eyes.

Pectoral pore minute, above and behind the pectoral spine.

Origin of dorsal fin one-fifth nearer tip of snout than to base of middle caudal rays in specimens .12 metre long; one-fifth nearer base of caudal rays than to tip of snout in a specimen .26 metre long.

Margin of all the fins rounded. Caudal with numerous accessory rays, the middle caudal rays 1–1$\frac{1}{3}$ in the head. Origin of ventrals below or slightly behind the first dorsal ray. Inner margin of pectoral spine serrate, its lower surface spiny.

Light brown mottled with darker, a series of about 5 light areas along the lateral line; fins speckled; the largest specimen is faded.

Head 4⅓–3⅘; depth 7–6; D. 10; A. 11; Br. 10–12.

Seven specimens .12–.26 m. Curico; Santiago. Steindachner.

LIX. PARIOLIUS.

Pariolius Cope, Proc. Acad. Nat. Sci. Phila. 1871, 289 *(armillatus)*.

Type: *Pariolius armillatus* Cope.

Dorsal fin placed in front of the ventrals. No nasal barbel. Opercle and preopercle unarmed. A single barbel on each maxillary and two pairs of mentals.

This genus is closely related to *Nematogenys* and *Trichomycterus*.

256. Pariolius armillatus.

Pariolius armillatus Cope, l. c. (Ambyiacu); E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 50, 1889.

Head flat, rounded; eyes small, superior. Interorbital 3⅔ in length of head. Maxillary and postmental barbels reaching beyond base of pectoral. Caudal acuminate. Dark brown, nearly black on the top of the head; under surfaces from anus brownish yellow, brown punctulate. A broad yellow collar at base of pectorals; a dark spot on base of caudal. D. 7; A. 11; Head 4½. (Cope.)

LX. PYGIDIUM.

Trichomycterus Valenciennes, Humboldt's Rec. d'Obs. Zool. et Anat. ii, 348, 1833 *(nigricans)* not *Thrichomycterus* Humboldt.

Thrychomycterus Cuv. & Val. Hist. Nat. Poiss. xviii, 485, 1846 (misquoted).

Thrichomycterus Girard, U. S. Nav. Astron. Exped. ii, 242, 1855 (misquoted).

Pygidium Meyen, Reise, i, 475, 1835 *(fuscum)*.

Type: *Pygidium fuscum* Meyen.

Habitat: Andes from Central Chile to Colombia; Callao Bay; Amazon to Cudajas; Southeastern Brazil; Central Argentine Republic.

The only claim for retention the name *Trichomycterus* possesses is its distinctiveness from *Thrichomycterus* Humb. =*Eremophilus* Humboldt. Twenty-two years before any species of *Trichomycterus* Val. was known, the name *Thrichomycterus* was proposed by Humboldt as an alternative for his *Eremophilus*, if future investigations should prove *Eremophilus* to be objectionable. Upon proposing the name *Trichomycterus* Valenciennes states: "Nous prenons pour le nouveau genre le nom de *Trichomycterus* imaginé par M. de Humboldt," so the names can hardly be considered distinct. Valenciennes afterwards misquotes himself, spelling the name THRY*chomycterus* instead of TRI*chomycterus*. Girard also misquotes Valenciennes, using *Thrichomycterus* instead of *Trichomycterus*.

The only available name for this genus seems to be *Pygidium*, based on some fish found floating in a river of Peru.

DOUBTFUL SPECIES OF PYGIDIUM.

As most of the young of the species of *Pygidium* are very much alike in coloration, and usually entirely different from the adult, we are compelled to place here most of the species based on young individuals, unless they were collected together with large individuals.

256.1. *Pygidium fuscum* Meyen, l. c. (Peru); Wiegman, Wiegman's Arch. 1835, ii, 269 (copied). By putting together the two descriptions quoted and the locality, one may infer that this species belongs to the genus *Trichomycterus auct.*

256.2. *Trichomycterus pallens* Philippi, MB. Ak. Berl. 1866, 715 (Chile). Light reddish; fins colorless; head 6½ in total. D. 9–10; A. 6.

256.3. *Trichomycterus marmoratus* Philippi, l. c. 714. Blackish gray, marbled with many black spots, as in *punctatus;* fins dark. Depth $10\frac{9}{11}$; D. 10; A. 6.

256.4. *Trichomycterus tenuis* Weyenbergh, Actas Acad. Nac. Cienc. Exactas, iii, 12, pl. iii, Buenos Aires, 1877 (Sierra de Cordoba, near Cruz-del-eje). Yellow, eyes and barbels black; head triangular; opercle and preopercl well armed. Body much compressed. D. 6; A. 5.

256.5. *Trichomycterus corduvensis* Weyenbergh, l. c. 11, pl. iii (Rio Primero). Obscure blotches on the back, the sides with a dusky band.

256.6. *Trichomycterus tigrinum* Philippi, l. c. Light with reddish points; fins immaculate. Head 6½; depth 6½ in total length. D. 9 or 10; A. 6.

256.7. *Pygidium poeyanum.*

Trichomycterus rivulatus Cope, Proc. Acad. Sci. Philad. 1874, 132 (Arequipa, Peru); not of Cuv. & Val. *Trichomycterus poeyanus* Cope, Proc. Am. Philos. Soc. 1877, 47. *Pygidium poeyanum* E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 50, 1889.

Habitat: Western slopes of southern Peru.

ANALYSIS OF THE SPECIES OF PYGIDIUM.*

a. Origin of dorsal in front of the origin of the anal.
- *b.* Dorsal rays 15–21; first pectoral ray not produced in a filament; gill-membranes joined to the isthmus.
  - *c.* D. 21; origin of dorsal equidistant from occiput and tip of caudal. Anal inserted below the 9th dorsal ray and terminating under the 17th. *macræi* 257.
  - *cc.* D. 15; origin of dorsal equidistant from tip of snout and tip of caudal; last ray of the anal under last ray of the dorsal. Distance of anal from base of caudal 3¾ in the length. *maculatum* 258.
- *bb.* Dorsal rays less than 15.
  - *d.* None of the dorsal rays prolonged.
    - *e.* Dorsal placed partly over the anal.

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* In the species examined by us the rudimentary rays of the dorsal and anal are counted.

f. Caudal emarginate; D. 14; gill-membrane free from the isthmus; upper maxillary barbels reaching pectorals. Origin of dorsal equidistant from tip of caudal and occiput. Distance of anal from base of caudal 5 in the length. *areolatum* 259.

ff. Caudal truncate or rounded.

g. First ray of the pectoral prolonged except in very young.

h. Teeth in broad bands in both jaws.*

i. Maxillary barbels reaching to the preopercle; D. 13; A. 11. *rivulatum* 260.

ii. Maxillary barbels reaching beyond the gill-opening; D. 11; A. 9. *brasiliensis* 261.

hh. Teeth in two series in each jaw (?).

j. Head narrowed forward, heart-shaped, scarcely wider than long; upper maxillary barbels reaching to base of pectoral; origin of anal below end of dorsal; a dark lateral band, two series of spots above it; top of head spotted. Head 7; D. 8; A. 6. (Kner & Steindachner.) *tænia* 262.

jj. Head of uniform width; width of mouth more than half length of head. Teeth in the anterior series of each jaw compressed. Maxillary barbels reaching beyond base of pectoral. Head and body with numerous dark spots. Head 7; D. 9; A. 7. (Kner & Steindachner.) *laticeps* 263.

gg. First ray of the pectoral not prolonged; none of the barbels reaching gill-opening. *oroyæ* 264.

ee. Dorsal entirely in front of the anal.

k. Caudal rounded.

l. Yellowish, upper half of sides and the back thickly punctate with darker. (Castelnau.) *punctatissimum* 265.

ll. Uniform brown, darkest on the back. *knerii* 266.

kk. Caudal emarginate.

m. Back and sides profusely spotted; first pectoral ray prolonged.

n. Dorsal behind the base of the ventrals.

o. Head longer than broad by a diameter of the eye.

p. Spots as large as or larger than the eye. *dispar* 267.

pp. Spots much smaller than the eye. *dispar punctulatum* 267a.

oo. Head as long as broad; upper maxillary barbel extending to the base of the pectoral. Head 6½; D. 8; A. 6. (Boulenger.) *nigromaculatum* 268.

nn. Dorsal partly over the base of the ventrals; D. 8; A. 12. (Cope.) *pardum* 269.

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* *Trichomycterus poeyanus* Cope, probably belongs here; as the shape of the caudal and length of the barbels are not given, we have not been able to give it a place in this key.

mm. Back and sides uniform yellowish or brownish.

q. Eye comparatively large; maxillary barbel not reaching to gill-opening. *immaculatum* 270.

qq. Eye minute, smaller than the posterior nares, maxillary barbel reaching beyond base of pectoral. (Steindachner.) *taczanowskii* 271.

dd. First dorsal ray prolonged in a filament; barbels scarcely extending beyond the eyes; caudal truncate. Blackish, lighter below. D. 11; A. 10. (Cuvier & Valenciennes.) *nigricans* 272.

aa. Origin of the dorsal over the origin of the anal; eye large, in anterior half of head; upper maxillary barbel reaching beyond base of pectoral. Caudal rounded; first pectoral ray prolonged. Chocolate brown; indistinct spots on the caudal peduncle; dorsal and caudal rays dotted with violet. Head 7; D. 8; A. 7. (Steindachner.) *amazonicum* 273.

257. Pygidium macræi.

Thricomycterus macræi Girard, U. S. Naval & Astron. Exped. ii, 245, 1855 (Uspullata(?) east side of the Cordilleras at an elevation of 7,000 feet).

Pygidium macræi E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 51, 1889 (Uspullatuo).

Habitat: Eastern slopes of Central Chile.

The single specimen, No. 8,298, of this species was presented to the Mus. Comp. Zool. by the Smithsonian Institution in 1859. It came from " Uspullatuo " and is most likely Girard's type.

Elongate, rather compressed, especially backward. Head as broad as long, snout rounded; eye small, midway between tip of snout and end of opercle; none of the barbels reaching the gill-opening.

Gill-opening scarcely continued forward below; joined to the isthmus for a distance equal to half the width of the mouth.

Pectorals obliquely truncate, the first ray not produced; origin of dorsal some distance behind the ventrals, equidistant from occiput and tip of caudal; fourth or fifth dorsal ray highest, then gradually decreasing in height to the last. Caudal emarginate, the upper lobe pointed, the lower rounded. Anal inserted below the 9th dorsal ray and terminating under the 17th. Ventrals inserted nearer tip of snout than to tips of middle caudal rays, reaching to the vent.

Color faded; light below, dark above.

Head 6⅕ (7 in the total); depth 6; D. 21; A. 10.

258. Pygidium maculatum.

Trichomycterus maculatus Cuv. & Val. Hist. Nat. Poiss. xviii, 493, 1846 (San Iago); Gay, Hist. Chile ii, 311, 1848 (Chile); Gunther, Cat. Fish. Brit. Mus. v, 273, 1864 (copied); Philippi, MB. Ak. Berl. 716, 1866 (Chile).

Thrichomycterus maculatus Girard, U. S. Naval. Astrom. Exped. 243, 1855 (Rio Mapocho) in part.

Pygidium maculatum E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 51, 1889 (Rio Mapocho, Chile).

Habitat: Western slopes of Central Chile.

The Smithsonian Institution presented the Mus. Comp. Zool. with three specimens, No. 7,736, of *Pygidium*, collected at Mapocho, Chile, during the astronomical expedition. If these are the specimens mentioned by Girard his *maculatus* is a composite of *maculatus* and *areolatus* as the specimens belong to these species. The specimens are, however, all somewhat smaller than Girard's figure.

Elongate, somewhat compressed, head as long as wide, caudal peduncle long and slender. Eye small, midway between tip of snout and end of opercle. Lips and lower surfaces of the head thickly covered with warts. Gill-openings not continued forward to below the eye, the membranes joined to the isthmus for a distance equal to one-third the width of the mouth.

Pectorals rounded, the first ray not produced; origin of dorsal in front of the vent, but some distance behind the ventrals, equidistant from tip of snout and tip of caudal, its last ray over the last ray of the anal. Caudal long, truncate. Anal short and high, its height about equal to the length of the caudal, its distance from the base of the caudal 3¾ in the length. Origin of the ventrals equidistant from tip of snout and base of caudal; their tips reaching beyond the vent.

Back and sides marbled with light and dark brown; fins pale, immaculate.

Head 5⅓ (6¼ in the total); depth 7½; D. 15; A. 9.

One specimen .092 m. Rio Mapocho, Chile.

259. Pygidium areolatum.

Trichomycterus areolatus Cuv. & Val. Hist. Nat. Poiss. xviii, 492, 1846 (Coast of Chile); Gay, Hist. Chile, ii, 309, 1848; Günther, Cat. Fish. Brit. Mus. v, 274, 1864 (Chile); Philippi, MB. Ak. Berlin, 714, 1866.

Thrichomycterus maculatus Girard, U. S. Naval Astron. Exped. 243, 1855 (Mapocho), in part.

Pygidium areolatum E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 51, 1889 (Rio Mapocho, Chile).

Habitat: Western slope of Central Chile.

Elongate, subterete. Lips and lower surface of head thickly covered with small warts. Gill-openings continued forward to below the eye, the membrane free from the isthmus. Upper maxillary barbels reaching to the pectorals.

Pectorals rounded, the first ray not prolonged; origin of dorsal slightly in front of the vent, equidistant from tip of caudal and occiput, its last ray over the fourth ray of the anal. Caudal very slightly emarginate. Distance of anal from the base of the caudal 5 in the length. Origin of ventrals equidistant between tip of snout and middle of caudal; tips of the ventrals not reaching the vent.

Light brown, with purple longitudinal streaks.

Head 5¾ (6⅖ in the total); depth 8½; D. 14; A. 8.

One specimen .103 m. Mapocho, Chile.

260. Pygidium rivulatum.

Trichomycterus rivulatus Cuv. & Val. Hist. Nat. Poiss. xviii, 495, 1846 (Guasacona); Günther, Cat. Fish. Brit. Mus. v, 274, 1864 (copied); Cope, Proc. Am. Philos. Soc. xvii, 47, 1877 (Lake Titicaca).

Pygidium rivulatum E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 51, 1889 (Cuzco; Moho and Puno on Lake Titicaca..

? *Trichomycterus incæ* Cuv. & Val. l. c. 496 (Rio Guatauai at Cuzco).

Trichomycterus gracilis Cuv. & Val. l. c. 497 (Rio Azangaro near Guasacona; Rio Guatanai near Cuzco; Rio Pontezualo near Coroico; Lake Compucila near Cuzco); Cope, Proc. Am. Philos. Soc. xvii, 681, 1877 (Tinta).

Trichomycterus barbatula Cuv. & Val. l. c. 498 (Guasacona; Rio Pontezualo near Coroico).

Trichomycterus pentlandi Castelnau, Anim. Nouv. Am. Süd, 49, pl. xxiv, fig. 1, 1855 (Lake communicating with the Ucayale).

Trichomycterus pictus Castelnau, Anim. Nouv. Am. Süd, 59, pl. xxiv, fig. 2, 1855 (Lake Titicaca).

Trichomycterus dispar Günther, Cat. Fish. Brit. Mus. v, 273, 1864 (in part); (Lake Titicaca; Rio de Pontezualo; Andes de la Paz; Guasacona Rio de Azangaro); Garman, Bull. Mus. Comp. Zool. iii, 275, 1875 (Lake Titicaca).

Habitat: Lake Titicaca; Ucayale and its tributaries.

This species is readily distinguished from *dispar* and *punctulatus* by the anterior position of the dorsal, the rounded caudal and the abrupt change from short accessory rays to the long caudal rays. The last character was moderately figured by Castelnau. It differs greatly in color and proportions at different ages. Cuv. & Val. described individuals 7 inches long as *rivulatus;* 4½ inches long as *incæ;* 3 inches long as *gracilis;* 2½ inches long as *barbatula;* while Castelnau represents the full grown in his *pentlandi*—the dorsal, however, has been misplaced.

We have examined 120 specimens of this species, mostly from Lake Titicaca. While the color markings sometimes approach those of *dispar* and *punctulatus*, it does not intergrade with them in the characters mentioned above.

Most of the specimens mentioned by Dr. Günther under *dispar* are evidently *rivulatus*. The specimen from the River Remac may be the *punctulatus* of Cuv. & Val.

This species is very variable; it is only in the fully grown, or specimens of about .35 m. long, that any constancy seems to exist.

In general form it resembles the North American *Amiurus catus*.

Tail compressed, head depressed, about as wide as long; eye equidistant from tip of snout and end of opercle. Nasal barbels reaching to the posterior margin of the eye, longer in the young. Upper maxillary barbel about to edge of preopercle. Mouth wide, more than one-third the length of the head.

Pectoral rounded, the first ray prolonged in a short filament, except in the very young.

Origin of dorsal equidistant from tip of caudal and a point between occiput and posterior nares; its posterior portion always over the anterior half of the anal.

Accessory rays of the caudal very numerous, their division from the true caudal rays marked. Caudal always rounded, its distance from the anal $4\frac{1}{2}$–$4\frac{2}{5}$ in the length.

Color of largest specimens dark reddish brown, sides with fine white or silvery spots and vermiculations. Specimens from .10–.20 m. greatly variable, grayish or dark brown, with darker markings; sometimes the ground color predominating, sometimes only forming reticulations between the dark markings; young with an interrupted dark band along the sides.

Head $4\frac{1}{2}$–$5\frac{1}{2}$ ($5\frac{1}{3}$–$6\frac{3}{5}$ in the total); depth $3\frac{3}{4}$–$6\frac{1}{2}$; D. 13; A. 11.

More than one hundred specimens .03–.35 m. Cusco, Moho and Puno on Lake Titicaca. Garman and Rand.

261. Pygidium brasiliensis.

Trichomycterus brasiliensis Reinhardt, MS. Lutken, Overs. Dan. Selsk. 1873, No. 3, 29 (Rio das Velhas); id. Velhas Flodens Fiske 135 and i, pl. iii. fig. 8, 1875 (Rio das Velhas).

Pygidium brasiliensis E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 51, 1889 (Rio Parahyba; Mendez; Lagoa Santa; Santa Cruz).

? Trichomycterus brasiliensis tristis Lutken l. c. 137 and i, 1875 (Rio das Velhas.

Habitat: Rio Janeiro to Rio San Francisco.

Elongate, compressed backward. Head greatly depressed, somewhat longer than wide except in the very young. Eye slightly in front of the middle of the head.

Barbels all long, in the adult the nasal extend beyond the occiput; upper maxillary barbels extending beyond the base of the pectorals.

Gill-opening continued forward to below the eye; the membrane with a free margin across the isthmus.

Pectorals short, the first ray curved and prolonged in a long filament.

Dorsal rounded, inserted in front of the vent, its last ray over the fourth anal ray in the adult, over the first in the young; its origin equidistant from tip of caudal and somewhere between occiput and eye.

Caudal short, broad, rounded; its distance from the anal 4½–5½ in the length.

Origin of ventrals about equidistant between tip of snout and tip of caudal; their tips reaching to or beyond vent.

Color in adult: back dark brown with darker spots; sides variegated with dark brown, purple and gray; fins obscurely spotted.

Color in young: yellowish, middle of sides with a series of about 9, more or less confluent spots of purplish, fainter spots on the tail below the median series; back with about ten cross bars, 5 of which are in front of the dorsal; fins plain or with dusky bars; top of head and line behind eye purplish.

Head 5–5½ (5⅝–6 in the total); depth 6; D. 11; A. 9.

Thirty-three specimens ♂ and ♀ .03–.15 m.; Rio Parahyba; Mendez; 2 miles from Lagoa Santa; Santa Cruz (Dom Pedro II). Thayer expedition.

262. Pygidium tænia.

Trichomycterus tænia Kner, "SB. Ak. Münch. 228, 1863"; Kner & Steindachner, Abh. Bayer. Ak. Wiss. 52, 1864, pl. vi, fig. 1. (Western slope Peruvian Andes); Günther, Cat. Fish. Brit. Mus. v, 274, 1864 (copied).

Pygidium tænia Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 51, 1889.

Habitat: Western slopes of the Peruvian Andes.

263. Pygidium laticeps.

Trichomycterus laticeps Kner, "l. c.;" Kner & Steindachner, l. c. 54, pl. vi, fig. 2 and fig. 1a. (Western slope Peruvian Andes.)

Pygidium laticeps Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 51, 1889.

Habitat: Western slopes of the Peruvian Andes.

264. Pygidium oroyæ.

Pygidium oroyæ Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 51, 1889 (Oroya).

Types, No. 3955; eight specimens; .115-.14 m. Pochachara, Oroya River.

This species is very closely allied to *P. brasiliensis.*

Rather robust; head about as long as wide; none of the barbels reaching the gill-opening. Gill-membrane narrowly joined to the isthmus, without a free margin.

Pectoral short, fan-shaped, the first ray not prolonged.

Dorsal inserted over the vent, its last ray over or behind the middle of the anal, its origin equidistant from anterior margin of eye or occiput and tip of caudal.

Caudal broadly rounded, its distance from the anal 4–4¾ in the length.

Origin of ventrals about midway between tip of snout and tip of caudal.

Dark chocolate brown; sides, back and unpaired fins with irrregular groups of dark points.

Head 5¾–6; depth 5¾–7; D. 12; A. 10.

265. Pygidium punctatissimum.

Trichomycterus punctatissimus Castelnau, Anim. Am. Sud, 49, pl. 24, fig. 3, 1855 (Araguay).

Pygidium punctatissimum E. & E. Proc. Cal. Acad. 2d Ser. ii, 52, 1889.

Habitat: Araguay.

266. Pygidium knerii.

Trichomycterus knerii Steindachner, Ichthyol. Beitr. xii, 21, pl. v, fig. 1-1*a*, 1882 (Canelos).

Pygidium knerii E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 52, 1889 (Cumbaca).

Habitat: Eastern slope of Ecuador; Cumbaca.

Elongate, compressed; head greatly depressed, flat above; the eyes entirely superior; width of the head less than its length. Barbels scarcely extending beyond the eyes, which are equidistant from tip of snout and end of opercle. A broad band of villiform teeth in each jaw.

Pectoral rounded, the first ray slightly prolonged. Origin of dorsal above posterior edge of base of ventrals, equidistant from tip of caudal and nares, the last ray over origin of anal.

Caudal rounded, its distance from the anal 4½ in the length.

Ventrals nearer tip of snout than tip of caudal.

Uniform brown, darkest on the back.

Head 5 (5⅔ in total); depth 5⅔; D. 10; A. 9.

One specimen .11 m. Cumbaca. Thayer Expedition.

267. Pygidium dispar.

Pygidium dispar Tschudi, Faun. Per. Ichthyol. 22, pl. 3, 1845 (Eastern slope of the Peruvian Andes, at an altitude of 14,000 feet); E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 52, 1889 (Callao, Peru).

Habitat: Eastern and western (?) slopes of the Peruvian Andes.

This species is distinguished by its emarginate caudal and the regularity of its color markings. It is very doubtful whether the male is of uniform color.

Elongate, compressed, the depth everywhere less than the length of the head. Head longer than wide by more than a diameter of the eye. Eye moderate, 4 in the interocular, equidistant from tip of snout and end of opercle. None of the barbels reaching quite to the gill-opening. Gill-openings continued forward to below the eye.

Pectorals obliquely rounded, the first ray produced in a filament. Origin of dorsal equidistant from tip of caudal and anterior margin of the eye, the whole fin in front of the anal and behind the ventral fins. Caudal emarginate. Distance of anal from base of caudal 6 in the length. Origin of ventrals midway between tip of snout and tip of caudal.

Reddish brown; sides, back, dorsal and caudal fins with large dark spots, those on the head smallest; lower surface plain.

Head 5⅕ (6 in total); D. 12; A. 9.

One specimen .195 m. Callao?, Peru. Steindachner.

267a. Pygidium dispar punctulatum.

Trichomycterus punctulatus Cuv. & Val. Hist. Nat. Poiss. xviii, 488, 1846 (Lima); Lütken, Velhas Flodens Fiske, 137, 1875 (Callao).

Trichomycterus punctatus Cuv. & Val. l. c. pl. 552.

Pygidium dispar punctulatum Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 52, 1889 (Rio Remac, near Lima).

Habitat: Western slopes of Peruvian Andes.

This variety can be distinguished by the small spots covering the sides and back.

Origin of dorsal equidistant from tip of caudal and somewhere between occiput and anterior margin of eye; distance of anal from base of caudal 6–6½ in the length.

Head 5⅓–5⅔ (6¼–6½ in the total); D. 12; A. 10.

Twenty-nine specimens .11–.18 m. Rio Remac near Lima. Steindachner.

268. Pygidium nigromaculatum.

Trichomycterus nigromaculatus Boulenger, Ann. & Mag. Nat. Hist. Ser. 5, vol. 19, 349, 1887 (Colombia).

Pygidium nigromaculatum Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 52, 1889.

Habitat: Colombia.

This species is very nearly related if not identical with *P. dispar.*

269. Pygidium pardum.

Trichomycterus pardus Cope, Proc. Acad. Nat. Sci. Philad. 1874, 132 (loc.?); id. Proc. Am. Philos. Soc. 1877, 45 (Jequetepeque; Callao Bay).

Pygidium pardum Eigenm. & Eigenm. Proc. Cal. Acad., 2d Ser. ii, 52, 1889.

Habitat: Callao Bay.

270. Pygidium immaculatum.

Pygidium immaculatum Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 1889 (Juiz de Fora; Sao Matheos; Goyaz).

Habitat: East-central Brazil.

Fourteen specimens .06–.20 m. Juiz de Fora; Sao Matheos; Goyaz.

A specimen from Macacos may be a variety of this species.

This may be the male of *P. brasiliensis*. The reproductive organs are, however, all empty as after spawning, so that it would be difficult to separate male from female, after they had been in alcohol twenty-five years. If it is a species distinct from *brasiliensis* it must breed earlier than that species, as most of our specimens of *P. brasiliensis* are ripe females.

Elongate, compressed backward; head gently depressed, the snout broad, spatulate; width of the head less than its length. Eye comparatively large, equidistant from tip of snout and tip of opercle. Barbels all rather short; the nasals scarcely reaching occiput or shorter; maxillaries not to gill-opening. Gill-opening continued forward to below the eye; the membrane with a free margin across the isthmus.

Pectorals rather short and broad, the first ray prolonged in a filament.

Dorsal truncate, its last ray in front of the anal, its origin equidistant from tip of caudal and base of nasal barbel or slightly nearer tip of caudal.

Caudal broad, emarginate, the upper lobe sometimes produced; its distance from the anal 5½ in the length.

Origin of ventrals equidistant from tip of caudal and tip of snout, or a little nearer tip of caudal; their tips reaching to the vent.

Brownish, lighter below; fins somewhat dusky; specimen from Sao Matheos uniform blackish brown.

Head 5⅓–5½ (6–6½ in total); D. 11; A. 9.

271. Pygidium taczanowskii.

Trichomycterus taczanowskii Steindachner, Flussfische Südam. iv, 22, pl. iv, figs. 1–1*b*, 1882 (Rio de Huambo; Rio de Tortora).

Pygidium taczanowskii E. & E. Proc. Cal. Acad. Sci. 2d Ser. ii, 52, 1889.

Habitat: Andes of Peru.

272. Pygidium nigricans.

Trichomycterus nigricans Cuv. & Val. Hist. Nat. Poiss. xviii, 494, 1846 (Santa Catharina); ? Gay, Hist. Chile, 311, 1848 (Chile); Günther, Cat. Fish. Brit. Mus. v, 274, 1864 (copied).

Pygidium nigricans Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 53, 1889.

Habitat: Santa Catharina.

273. Pygidium amazonicum.

Trichomycterus amazonicum Steindachner, Flussf. Südam. iv, 29, pl. vi, figs. 4–4*a*, 1882 (Cudajas).

Pygidium amazonicum Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 53, 1889.

Habitat: Amazon near Cudajas.

LXI. EREMOPHILUS.

Eremophilus Humboldt, Rec. d'Obs. Zool. et Anat. i, 17, pl. 6, 1811 *(mutisii)*.

Thrichomycterus Humboldt, l. c. (alternative of *eremophilus*).

Trachypoma Giebel, "Z. Ges. Ntrw. iii, 97, 1871" *(marmoratum=mutisii)*.

Type: *Eremophilus mutisii* Humboldt.

This genus differs from *Pygidium* in having no ventral fins.

274. Eremophilus mutisii.

Eremophilus mutisii Humboldt, l. c. (Bogota); Valenciennes, Humboldt, l. c. ii, 340, 1835; Cuv. & Val. Hist. Nat. Poiss. xv, 500, pl. 553, 1846 (Bogota); Günther, Cat. Fish. Brit. Mus. v, 275, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 53, 1889.

Trachypoma marmoratum Giebel, l. c. (loc. ?).

Habitat: Tributaries of the Rio Magdalena.

Yellowish with reticulating brown lines and dots. Head 6; Br. 8; D. 11; A. 9. (Valenciennes.)

LXII. TRIDENS.

Tridens Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 53, 1889 *(melanops).*

Type: *Tridens melanops* E. & E.

Ventrals small, nearer tip of snout than to base of caudal. Anal long, inserted in front of the dorsal fin. Head greatly depressed, the eye infringing on the upper and lower surfaces of the head. A series of fine labial teeth; stronger teeth in the jaws. Gill-membranes united, forming a broad, free fold across the isthmus. Opercle and preopercle armed. Maxillary barbels 2.

275. Tridens melanops.

Tridens melanops Eigenm. & Eigenm. l. c. (Iça).

Types, No. 8137. Twenty-seven specimens, the largest .027 m. Iça. James.

Body compressed, extremely slender. Head broad, the snout rounded; mouth broad, inferior. Opercle long and slender, terminating in three spines, trident-shaped. Preopercle with similar but smaller spines. Barbels minute, scarcely evident.

Distance of origin of dorsal fin from extremity of caudal 3 in the length; origin of anal fin from extremity of caudal 2½ in the length. Anal rays rapidly decreasing in height backward, the last ray about over the last ray of the dorsal. Caudal rounded, without accessory rays.

Yellowish; posterior half of the caudal fin dusky; a series of black spots along the base of the anal.

Head 9; depth 13; D. 10–12; A. 20–25.

276 Tridens brevis.

Tridens brevis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 54, 1889 (Tabatinga).

Type, No. 8160; one specimen; .021 m. Tabatinga. Bourget.

Body short and deep. Head as broad as long; mouth broad, inferior. Opercle with a bunch of six or more spines; preopercle with a smaller bunch of spines. Barbels well developed, the outer one extending to the base of the pectoral, the inner to the gill-opening. Eye large nearer end of opercle than tip of snout.

Distance of origin of dorsal from tip of caudal little more than 2 in the length.

Anal inserted very little in front of the dorsal and extending some distance beyond it, its rays decreasing in height toward the caudal. Origin of anal from extremity of caudal less than 2 in the length.

First pectoral ray greatly produced.

Caudal emarginate.

Yellowish; blackish dots along the bases of the fins; a series of blackish dots along the middle line of the sides, similar spots on the back. Head with brown dots.

Head 6; depth 8; D. 9; A. 22.

The two species here described have evidently not attained their full growth. They may prove to be the young of some species of *Pygidium*. If so their characters undergo a wonderful change during growth. As nothing is known of the young stages of these fishes we have thought best to describe these specimens as new. They approach the *P. amazonicum* Steindachner, from the Jutahy most nearly.

LXIII. PSEUDOSTEGOPHILUS.

Pseudostegophilus Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 54, 1889 (*nemurus*).

Type: *Stegophilus nemurus* Günther.

Caudal widely forked. Mouth inferior, each jaw with series of fine teeth; upper lip with several series of fine movable teeth; no teeth on the vomer.

277. Pseudostegophilus nemurus.

Stegophilus nemurus Günther Proc. Zool. Soc. 1868, 429 (Upper Amazon).

Pseudostegophilus nemurus E. & E. l. c. (? Marañon or Ucayale).

Habitat: Marañon and its tributaries.

On account of its widely forked tail this species is probably generically distinct from the typical *Stegophilus*, which has a rounded caudal.

Body comparatively short and thick; head short, as broad as long, the snout broadly rounded. Eye 1 in the snout, 4 in the head. Mouth broad, upper lip with about four series of fine teeth, those of the inner series longest; intermaxillaries and mandibles with four or five series of closely crowded, pectinate teeth.

Opercle with a bunch of about 8 spines; preopercle with similar spines.

Origin of dorsal equidistant from tip of snout and tip of middle caudal rays. Upper caudal ray 3 times as long as the middle rays, 3½ in the length. Anal placed entirely behind the dorsal; origin of ventrals about equidistant from base of caudal and tip of snout.

Pectoral pore small.

Light; back with three large dark brown, black edged, saddle-shaped spots, one behind the middle of the dorsal and the other in front of the dorsal; tail with a broad collar of similar color; lower caudal lobe black; upper caudal lobe light marbled with blackish, its tip black.

Head 5; D. 9; A. 7.

A single specimen .065 m. "Marañon & Ucayale" Chas. Sarkaday.

LXIV. Stegophilus.

Stegophilus Reinhardt, Naturhst. Foren. Meddel. 1858, 79, pl. ii *(insidiosus)*.

Type: *Stegophilus insidiosus* Reinhardt.

Body elongate, slender, head depressed, the mouth inferior, each jaw with fine teeth arranged in regular series; no teeth on the vomer; upper lip with two or more series of elongate freely movable teeth. Orbit without a free margin; gill-membrane joined to the isthmus, the gill-opening a narrow slit in front of the pectorals; opercle and preopercle with a bunch of strong spines. Dorsal and anal placed posteriorly; ventrals in front of the dorsal.

Habitat: Rio Plata; Rio das Velhas; Amazon and its tributaries.

Reinhardt states that *S. insidiosus* lives in the gill-cavity of *Sorubim*. He seems to have taken the labial teeth for intermaxillary teeth, and the intermaxillaries as the branches of the vomer.

ANALYSIS OF THE SPECIES OF STEGOPHILUS.

a. Caudal emarginate.

b. Back spotted, sides with a series of dark spots. D. 8–9; A. 7.

c. Dorsal 8; head as long as broad.

d. Origin of dorsal nearer tip of snout than tip of caudal; head 8 in the total length; eye 3½ in the head; lateral spots most prominent on the tail; tips of the caudal lobes dusky; base of caudal with a double spot. (Steindachner.) *maculatus* 278.

dd. Origin of dorsal much nearer tip of caudal than tip of snout; head 6½ in the total length, eye 4 in the length; lateral spots most prominent under the dorsal; caudal with a dark bar extending from the tips of the lower rays to the middle of the upper; base of caudal with dark spots. (Boulenger.) *punctatus* 279.

cc. Dorsal 9; head longer than broad, 6½ in the total length; eye 3½ in the head; origin of dorsal much nearer tip of caudal than tip of snout; lateral spots most prominent on the tail; caudal with faint dusky spots. *intermedius* 280.

bb. Back and sides plain; D. 10; A. 9; caudal with dusky spots, the tip of its lower lobe being black; origin of dorsal much nearer tip of caudal than tip of snout; head longer than broad, about 6 in the total length; eye 3⅖ in head; caudal with numerous accessory rays. (Steindachner.) *macrops* 281.

aa. Caudal rounded; dorsal much behind the middle of the total length. D. 9–10; color uniform.

f. Caudal without accessory rays; dorsal entirely in front of the anal; head about 6 in the total length. D. 9; A. 7. (Reinhardt.) *insidiosus* 282.

ff. Caudal with numerous accessory rays; dorsal partly over the anal; head about 7 in the total length. D. 9–10; A. 8. (Steindachner.) *reinhardtii* 283.

278. Stegophilus maculatus.

Stegophilus maculatus Steindachner, Denk. Ak. Wien, xli, 25, plate iv, fig. 2, 1879 (La Plata); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 54, 1889.

Habitat: Rio Plata.

This species is known only from the types.

279. Stegophilus punctatus.

Stegophilus punctatus Boulenger, Proc. Zool. Soc. Lond. March, 1887, 279, pl. xxi, fig. 4 (Canelos); Eigenm. & Eigenm. l. c.

Habitat: Eastern Ecuador.

280. Stegophilus intermedius.

Stegophilus intermedius Eigenm. & Eigenm. l. c. (Goyaz).

Type, No. 9,842; one specimen .08 m. Goyaz. Senhor Honorio.

This species, found in a region intermediate between the localities where *punctatus* and *maculatus* are found combines in a remarkable way the characters of those species.

Elongate, compressed behind, depressed forward; head somewhat longer than wide, snout pointed; eye large, 1 in the snout, 3½ in the head. Mouth large; upper lip with two series of teeth; intermaxillaries and mandibles with four series of depressible teeth, those of the inner series enlarged at the tip. Lower lip not dilated, barbel shorter than the eye.

Opercle with two spines; preopercle with 5 or 6 claw-like spines.

Origin of dorsal about equidistant from tip of caudal and occiput; caudal emarginate; anal placed entirely behind the dorsal; origin of ventrals equidistant from bases of caudal and pectoral.

Light brown; entire upper surface with rather large dark brown spots; a series of larger dark spots along the middle line of the sides, the spots becoming larger towards the tail; caudal with a few, faint dark spots.

Head 5½; D. 9; A. 7.

281. Stegophilus macrops.

Stegophilus macrops Steindachner, Flussfische Südam. iv, 28, pl. vi, fig. 2-2a, 1882 (Lake Manacapuru, above Manaos); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 55, 1889.

Habitat: Lake Manacapuru.

This species is known only from the types; there are no specimens in the Museum of Comparative Zoology.

282. Stegophilus insidiosus.

Stegophilus insidiosus Reinhardt, Naturhist. Foren. Vidensk. Meddel. 1858, 79, pl. ii (Rio das Velhas); Günther, Cat. Fish. Brit. Mus. v, 276, 1864 (copied); Lütken, Vidensk. Selsk. Skr. 1875, 135 and i, figs. 1-3 (Rio das Velhas); E. & E. l. c.

Habitat: Rio das Velhas.

283. Stegophilus reinhardtii.

Stegophilus reinhardtii Steindachner, Flussfische Südam. iv, 28, pl. vi, fig. 1, 1882 (Lake Manacapuru; Rio Iça; Montalegre; Teffé; Tabatinga); E. & E. l. c.

Habitat: Solimoens and tributaries.

This species seems to have been collected at several places during the Thayer expedition, but no specimens could be found in the museum of Comparative Zoology.

LXV. VANDELLIA.

Vandellia Cuv. & Val. Hist. Nat. Poiss. xviii, 386, pl. 547, 1846 *(cirrhosa)*.

Type: *Vandellia cirrhosa* Cuv. & Val.

This genus is very closely related to *Stegophilus* from which it differs in the dentition and the position of the mouth.

Teeth pointed, in a single series on the intermaxillaries only; mouth subinferior. Body terete, greatly elongate; opercle and preopercle with spines. Gill-membranes broadly united with the skin of the isthmus, the gill-opening being reduced to a short slit in front of the pectoral. Orbit without a free margin. Dorsal fin placed posteriorly and behind the ventrals.

Habitat: Solimoens and westward to the Andes.

ANALYSIS OF THE SPECIES OF VANDELLIA.

a.	Head 9 in the total length; caudal rounded.	*cirrhosa* 284.
aa.	Head about 12 in the total length; caudal slightly emarginate; a dusky median stripe on caudal.	*plazaii* 285.

284. Vandellia cirrhosa.

Vandellia cirrhosa Cuv. & Val. Hist. Nat. Poiss. xviii, 386, pl. 547, 1846 (loc. ?); Castelnau, Anim. Amér. du Sud, 51, pl. 28, fig. 2, 1855 (Brazil); Günther, Cat. Fish. Brit. Mus. v, 277, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 55, 1889 (Hyavary).

Habitat: Hyavary.

Head slightly longer than wide; snout rounded. Eye large, less than 1 in the snout, less than 3 in the head. Mouth rather small, the upper jaw little projecting; a few long, pointed teeth on the intermaxillaries. Barbel comparatively long, about 2 in the head; lower lip not dilated. Opercle and preopercle each with a bunch of 6–10 spines.

Origin of the dorsal fin twice as far from tip of snout as from margin of caudal, the dorsal fin placed partly over the anal.

Uniform light brown.

Head 9 in the total length; D. 9; A. 10.

One specimen .04 m. Hyavary. Bourget.

285. Vandellia plazaii.

Vandellia plazaii Castelnau, l. c. pl. 28, fig. 1, 1855 (Ucayale); Vaillant, Bull. Soc. Philom. Series 7, iv, 159, 1880 (Calderon); Eigenm. & Eigenm. l. c. (Lake Hyauuary).

Vandellia plazæ Günther, Cat. Fish. Brit. Mus. v, 277, 1864 (copied).

Habitat: Ucayale; Calderon; Lake Hyauuary.

One specimen .125 m. Lake Hyanuary. Bourget.

LXVI. PAREIODON.

Pareiodon Kner, SB. Ak. Wien, xvii, 160, 1855 *(microps)*.

Pariodon Günther, Cat. Fish. Brit. Mus. v, 275, 1864 (substituted).

Centrophorus Kner, Denk. Ak. Wien, xvii, 161, 1855 (substituted for *Pareiodon*).

Astemomycterus Guichenot, Rev. et Mag. Nat. Hist. xii, 525, 1860 *(pusillus)*.

Type: *Pareiodon microps* Kner.

Gill-membrane united with the isthmus; a single series of incisor-like teeth on each jaw; two pairs of maxillary barbels; opercle and preopercle with short spines; caudal forked.

286. Pareiodon microps.

Pareiodon microps Kner, SB. Ak. Wien, xvii, 160, 1855 (Borba?); Eigenm. & Eigenm. l. c.

Pariodon microps Günther, Cat. Fish. Brit. Mus. v, 275, 1864 (copied); Cope, Proc. Acad. Nat. Sci. Phila. 1872, 290 (Ambyiacu).

Trichomycterus pusillus Castelnau, l. c. 50, pl. 24, fig. 4, 1855 (Araguay; Amazon).

Astemomycterus pusillus Guichenot, l. c. (Araguay; Amazon).

Habitat: Amazons and tributaries.

Body terete; lips thickly papillose, interopercle with 5 spines; grayish above, lighter below.

Head 8; D. 9; A. 7. (Kner.)

LXVII. MIUROGLANIS.

Miuroglanis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 55, 1889 (*platycephalus*).

Type: *Miuroglanis platycephalus* E. & E.

This genus is based on a very small specimen. The characters are, however, so well marked that we do not hesitate to describe it as new.

Gill-membrane broadly united with the isthmus, without a free margin. Maxillary barbels two. Mouth inferior. Each jaw with several series of strong teeth. Opercle and preopercle with numerous strong spines. Caudal rounded.

287. Miuroglanis platycephalus.

Miuroglanis platycephalus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 56, 1889. (Jutahy.)

Type, No. 8172; one specimen .017 m. Jutahy. James, Thayer & Talisman.

Body short, compressed and rather deep. Head greatly depressed, wider than long. Eye large, lateral, placed behind the angle of the mouth. Mouth subinferior, the upper jaw projecting slightly.

Upper maxillary barbel scarcely extending to the gill-opening; no nasal or mental barbels.

The opercular and preopercular patches of spines united.

Origin of the dorsal fin little behind that of the anal; its distance from the tip of the snout somewhat less than twice its distance from the tip of the caudal.

Head 5½; D. 10; A. 15.

FAMILY VI. ARGIIDÆ.

>*Siluroidei astroblepiformes* Bleeker, Nederl. Tijdschr. Dierk. i, 110, 1863.

<*Siluridæ proteropodes* Günther, Cat. Fish. Brit. Mus. v, 4, 1864.

=*Argiidæ* Gill, Arrangement of Families of Fishes, 19, 1872. E. & E. Am. Nat. July 1888.

Little is known of the anatomy of these fishes.

Mouth inferior; lower lip expanded and reverted. Teeth bicuspid, in a narrow band in each jaw. Body entirely naked. Gill-membranes broadly united with the isthmus. Anterior and posterior nares approximated. Maxillaries with a barbel; no mental or nasal barbels.

Dorsal placed over the ventrals. A bony diaphram.

Air-bladder enclosed in the lateral processes of the anterior vertebræ.

It is doubtful whether the genus *Astroblepus* belongs here or not.

ANALYSIS OF THE GENERA OF ARGIIDÆ.

a. Adipose fin a long low fold of skin which gradually merges into the dorsal profile anteriorly and posteriorly; lower lip very broad. ARGES LXIII.

aa. Adipose fin short, with a spine placed near the caudal fin. CYCLOPIUM LXIX.

aaa. Adipose and ventral fins wanting. ASTROBLEPUS LXX.

LXVIII. ARGES.

Arges Cuv. & Val. Hist. Nat. Poiss. xv, 333, pl. 444, 1840 (*sabalo*).

Brontes Cuv. & Val. l. c. 341, pl. 445 (*prenadilla*).

Type: *Arges sabalo* Cuvier & Valenciennes.

Habitat: Peruvian Andes and Cordilleras.

We have not been able to examine any species of this genus. They have all been well figured and described by Steindachner.

288. Arges sabalo.

Arges sabalo Cuv. & Val. Hist. Nat. Poiss. xv, 335, pl. 444, 1840 (Santa Anna); Castelnau, Anim. Am. Sud. 40, 1855 (Rivers of Central Brazil); Günther, Cat. Fish. Brit. Mus. v, 222, 1864 (copied); Steindachner, Ichthyol. Beitr. iv. 48 (Tullumayo, Amable Maria); Cope, Proc. Am. Philos. Soc. xvii, 681, 1878 (Rio Urubamba, 10,000 feet alt.); Steindachner, Flussfische Südam. i, 23. 1879 (Tullumayo; Amable Maria; Tambillo); id. l. c. iv, 17, pl. iv, fig. 2, 1882 (Rio Huambo).

Habitat: Peruvian Andes and Cordilleras.

289. Arges prenadilla.

Brontes prenadilla Cuv. & Val. xv, 343, pl. 445, 1840 (Cotopaxi); Günther, Cat. Fish. Brit. Mus. v, 224, 1864 (copied).

Arges prenadilla Steindachner, Flussfische Südam. iv, 20, pl. vi, fig. 5, 1882, notes on the types. (Peru.)

Arges brachycephalus Günther, Proc. Zool. Soc. Lond. 1859, 92 (Andes of Western Peru); id. Cat. Fish. Brit. Mus. v, 222, 1864 (copied).

Habitat: Andes of Peru.

290. Arges longifilis.

Arges longifilis Steindachner, Flussfische Südam. iv, 19, pl. v, fig. 3-3*b*, 1882 (Rio Huambo).

Habitat: Rio Huambo.

291. Arges peruanus.

Arges peruanus Steindachner, Ichthyol. Beitr. xiv, 51, pl. ix, figs. 3-6 (Amable Maria); id. Flussfische Südam. i, 23, 1879 (Amable Maria; Tambillo; Chota).

Habitat: Andes of Peru.

LXIX. CYCLOPIUM.

Pimelodus Humboldt, Obs. Zool. i, 21, pl. 6, 18. (sp.)

Arges Cuv. & Val. xv, 340, 1840. (sp.)

=*Cyclopium* Swainson, Nat. Hist. Fish. ii, 305, 1839 (*humboldtii*=*cyclopum*).

=*Stygogenes* Günther, Cat. Fish. Brit. Mus. v, 223 (*humboldtii*).

Type: *Pimelodus cyclopum* Humboldt.

Adipose fin short, placed near the caudal, with a short spine. Teeth small, those of the mandibles and the inner ones of the intermaxillary broadened and notched at the tip. Eyes small, placed on the upper surface of the head.

If the species *Pimelodus cyclopum* is ever to be recognized it must be referred to the genus *Stygogenes* Günther =*Cyclopium* Swainson. The poor description of *P. cyclopum* makes an absolute identification impossible. There are, however, in the Museum of Comparative Zoology, two specimens from Quito—i. e. from the habitat of *P. cyclopum*—which fairly agree with the figure and description of *P. cyclopum*, leaving out of consideration the spine in the adipose fin. They also agree with the description of *Stygogenes humdoldtii* Gthr. with the exception of the number of fin rays. The two species may be considered identical. Putnam (Am. Nat. 1871) identifies with it also *Arges brachycephalus*, but a re-examination of the types of the two forms by Dr. Günther proves them to be distinct.

292. Cyclopium cyclopum.

Pimelodus cyclopum Humboldt, Observ. Zool. i, 21, pl. 6 (Cotopaxi; Imbaburu; Cargueirazo; Tungaragua); Orton, The Andes and the Amazon, 3d ed. 143, 1875 (San Pablo Lake at base of Caraguairazo).

Arges cyclopum Cuv. & Val. Hist. Nat. Poiss. xv, 340, 1840 (copied).

Stygogenes cyclopum Günther, Cat. Fish. Brit. Mus. v, 224, 1864 (copied).

Cyclopium cyclopum Putnam, Am. Naturalist, 395, 1871 (Quito); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 164, 1888 (Quito).

Cyclopium humboldtii Swainson, Nat. Hist. Fish. ii, 305, 1839 (copied).

Stygogenes humboldtii Günther, l. c. 223, 1864 (loc.?); Boulenger, Proc. Zool. Soc. Lond. 1887, 276, pl. xxi, fig. 2 (Canelos).

Habitat: Andes of Ecuador.

Body elongate, slender, depressed in front, somewhat compressed behind. Head short and broad, much depressed, its lower surface flat, its upper surface somewhat arched; width of head 1 in its length, depth 2.

Eyes very small, placed just behind the middle of the head, directed upward; interocular space 4 in the length of the head; nostrils placed well forward.

Maxillary barbels ⅔ length of head; lower lip broad, with a deep median cleft. Teeth in bands in both jaws, the teeth of the outer series in the intermaxillary simple, slender, conical, curved; teeth of the inner series several times as wide at their tips as at base, deeply notched; teeth of the lower jaw similar to those of the inner series of the upper jaw, the outer ones much larger.

Gill-opening not extending forward to below the eye.

Anterior region of the body with a median series of conspicuous pores.

Distance of the dorsal fin from the end of the snout 2⅘ in the length; spine of the adipose fin very small.

Anal rays closely crowded. Ventral fins inserted slightly in advance of the dorsal, the outer ray as long as the head.

Pectoral as long as the ventral fins, reaching beyond their base. The first ray of all the fins thickened and covered with backward directed bristles.

D. 7; A. 7; head 4½.

Two specimens .07–.08 m. Quito. Prof. James Orton.

293. Cyclopium güntheri.

Stygogenes güntheri Boulenger, Ann. & Mag. Nat. Hist. Ser. 5, vol. 19, 348, 1887 (Colombia).

Habitat: Colombia.

The description of this species would prove it to be a very close relative of *C. cyclopum* differing from it in the length of the head, which is contained 3½ to the base of the caudal.

LXXI. ASTROBLEPUS.

Astroblepus Humboldt, Observ. Zool. i, 19 *(grixalvii)*.

This genus is known only from the very imperfect decription by Humboldt.

294. Astroblepus grixalvii.

Astroblepus grixalvii Humboldt, Observ. Zool. i, 19, pl. vii; Cuv. & Val. Hist. Nat. Poiss. xv, 349, 1840 (copied); Günther, Cat. Fish. Brit. Mus. v, 224, 1864 (copied).

FAMILY VII. LORICARIIDÆ.

<*Siluroides* Cuvier, Régne Animal ed. i, vol. ii, 199, 1817.

=*Goniodontes* Agassiz, Gen. et Spec. Pisc. Bras. 1, 1829.

=*Loricata* Kner, Die Panzerwelse, 75, 1853.

=*Loricarioidei* Bleeker, Nederl. Tijdschr. Dierk. i, 77, 1863.

<*Hypostomatina* Günther, Cat. Fish. Brit. Mus. v, 11, 1864.

<*Loricariidæ* Gill, Arrangement of Families Fishes, 19, 1872.

=*Loricariidæ* E. & E. Am. Nat. July 1888.

Sides and back and sometimes the lower surface covered with bony plates which are sometimes provided with teeth-like spines. Mouth wholly inferior, provided with a broad disk-like lip. Maxillary bones thin, with a terminal barbel which is partly united with the oval disk; no mental or nasal barbels. Teeth, if present, hooked and usually two-lobed at the tip; the active ones in a single series; intermaxillaries separate from each other, box-shaped and filled with numerous relay teeth, dentaries separate from each other and constructed like the intermaxillaries. No teeth on the palate; no frontal or occipital fontanels. Dorsal fin present, situated on the abdominal portion of the vertebral column, and not connected with the occipital by processes. Adipose fin, if present, composed of a spine, and a thin membrane. Anal fin short. Gill-membranes joined to the isthmus, the gill-openings restricted to the sides. Intestinal canal elongate, coiled upon itself.

Nares close together, a flap between them, little above and in front of the eyes. Iris with a flap encroaching on and sometimes entirely dividing the pupil.

Caudal vertebræ compressed, the neural and hœmal spines expanded, forming a continuous ridge above and below.

Air-bladder cavity narrow at the base and expanded beneath the temporal plate, usually communicating with the exterior at a notch in the posterior margin of the temporal plate, in *Otocinclus* and *Microlepdogaster* by many holes in the temporal plate.

Strong movable bones, (ribs ?) extend from near the posterior end of the coalesced vertebræ outward. They are compressed and widened at the base. In the *Plecostominæ* they are forked at the base, the lower branch articulating with the centrum of the vertebra, the upper branch with the middle of the neural spine. In the *Loricariinæ* (*Loricaria læviuscula*) their base is truncate and touches the vertebra from the lower margin of the centrum to the middle of the neural spine. Externally these " ribs " articulate with a more or less paddle-shaped dermal bone, the "arm" of the paddle being concealed by other dermal plates, the expanded portion of the paddle forming the plate in front of the dorsal plate. In the *Plecostominæ* they also articulate with the temporal plates. The whole apparatus gives fixity to the dorsal spine but prevents lateral motion of the head. A similar structure is found in the *Doradinæ*.

ANALYSIS OF THE GENERA OF LORICARIIDÆ.

a. Tail long, depressed posteriorly, with a single series of plates on the sides; dorsal fin inserted behind the origin of the ventrals (except in *Harttia*), upper caudal lobe sometimes produced; no adipose fin; intestinal canal usually not much longer than the body. (LORICARIINÆ.)

  b. Dorsal fin placed above the anal, 6–8 plates between the dorsal fin and the occipital plate; snout long and narrow; ventral surface covered by two or three series of large plates; body very slender, subcyclindrical. FARLOWELLA LXXI.

  bb. Dorsal fin inserted above or slightly behind the anal; 2–5 plates between the dorsal fin and the occipital plate.

    c. Eyes superior.

      d. Tail with strong lateral keels.

        e. Snout elongate, the tip expanded and margined with recurved spines; body greatly depressed; head strongly striate-hispid; a strong curved pectoral spine. Teeth rudimentary, present in the lower jaw only. HEMIODONTICHTHYS LXXII.

        ee. Snout not expanded at tip nor margined with spines. LORICARIA LXXIII.

      dd. Tail without lateral keels; body short and broad, greatly depressed; belly naked; teeth numerous, well developed. HARTTIA LXXIV.

    cc. Eyes strictly lateral, the orbit slightly infringing on the lower surface of the head. OXYROPSIS LXXV.

aa. Tail short, compressed or rounded; lips entire; lower caudal lobe sometimes produced; adipose fin usually present.

  e. Ventral surface covered with two or three series of rather large plates (species of small size). D. I, 6 or 7; margin of snout granular, or with short hooklets; preopercle without erectile spines; dorsal inserted slightly before or behind the ventrals. HYPOPTOPOMINÆ.

  f. Head greatly depressed; orbit infringing on its upper and lower surface; snout spatulate; adipose fin present or wanting. HYPOPTOPOMA LXXVI.

  ff. Head moderately depressed; orbit wholly lateral.

    g. Temporal plate normal, imperforate.

h. Adipose fin absent. HISONOTUS LXXVII.

hh. Adipose fin present. PAROTOCINCLUS LXXVIII.

gg. Temporal plate perforated, coarsely sieve-like; no adipose fin; dorsal inserted over origin of ventrals. OTOCINCLUS LXXIX.

ee. Ventral surface naked or covered with minute, granular plates; intestines greatly elongate, many times as long as the body. PLECOSTOMINÆ.

i. Temporal plate perforate; dorsal inserted far behind the ventrals. MICROLEPIDOGASTER LXXX.

ii. Temporal plate imperforate.

j. Margin of the snout granular or sometimes a naked spot at tip; scutes of the lower surface of the tail exposed.

k. Dorsal I, 7 or 8.

l. Teeth fine, scarcely enlarged at tip, usually numerous.

m. Interopercle without erectile spines. D. I, 7.

n. Adipose fin present.

o. A. 6; tail comparatively long, terete; adipose fin far removed from the dorsal fin; ventral surface with a median, subcircular patch of granules; (species of small size). NEOPLECOSTOMUS LXXXI.

oo. A. 5; tail short, compressed; distance of adipose fin from dorsal not much longer than base of dorsal fin, sometimes much shorter; ventral surface irregularly granular. (Species of moderate and large size.) PLECOSTOMUS LXXXII.

nn. Adipose fin none. RHINELEPIS LXXXIII

mm. Interopercle with erectile spines, borne on a movable plate.

p. Dorsal and adipose fins distant. HEMIANCISTRUS LXXXIV.

pp. Dorsal and adipose fins subcontinuous. PARANCISTRUS LXXXV.

ll. Teeth enlarged, bowl-shaped at tip, few, overlapping; adipose fin present. D. I, 7; A. 5.

q. Interopercle without erectile spines. COCHLIODON LXXXVI.

qq. Interopercle with a large bundle of erectile spines. PANAQUE LXXXVII.

kk. Dorsal I, 10–13. PTERYGOPLICHTHYS LXXXVIII.

jj. Margin of the snout with spines or bristles, not granular.

r. Adipose fin present.

s. Lower surface of the tail rounded, the plates exposed; dorsal short, the last ray not adnate. Not more than one azygous plate in front of the adipose spine; marginal spines of the head longest on the preopercle. PSEUDANCISTRUS LXXXIX.

ss. Lower surface of the tail flat, the plates covered with skin; six or seven azygous plates in front of the adipose spine; marginal spines strongest forward, none on the interopercle.

t. Dorsal long, I, 9 or 10, the last ray adnate; plates exposed at base. DELTURUS XC.

tt. Dorsal short, I, 7, the last ray free; basal portions of plates concealed by membrane; a naked area behind dorsal fin. HEMIPSILICHTHYS XCI.

rr. Adipose fin none; lateral plates entirely isolate; back behind dorsal fin with large plates. ACANTHICUS XCII.

jjj. Margin of the snout naked, without bristles, granules or tentacles; interopercle with erectile spines. CHÆTOSTOMUS XCIII.

jjjj. Margin of the snout with tentacles; sometimes naked in females; ventral surface naked; interopercle with a bunch of spines inserted on a movable plate. ANCISTRUS XCIV.

SUBFAMILY LORICARIINÆ.

LXI. FARLOWELLA.

Acestra Kner, Panzerwelse, 93, 1853 (sp.), preoccupied in Hemiptera Dall, 1852.

Farlowella Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 32, 1889. *(acus.)*

Type: *Acestra acus* Kner.

Very slender, elongate; snout narrow, produced; dorsal fin inserted at least partially over the ventrals. Six or more large plates between the occipital and the dorsal.

Habitat: Amazon and its tributaries; Caracas.

The species of this genus are the extremes in slenderness and in the prolongation of their snouts.

ANALYSIS OF THE SPECIES OF FARLOWELLA.

a. Upper angle of gill-opening nearer beginning of dorsal than to tip of snout.

b. Snout with smooth or granular plates.

c. Belly with two series of longitudinal plates.

d. A. 4; space between cavity of mouth and base of pectoral with four longitudinal rows of scutes arranged in three transverse series; maxillary barbel short. Eye 3 in interorbital. Scutes with small granulations longitudinally arranged. Head to tip of occipital scarcely more than one-third of the length. Caudal little developed. Outer rays of the fins with brown dots. D. I, 6; P. I, 5; V. I, 4; Lat. l. 34. (Günther.) *gladiola* 295.

dd. A. 6; space between cavity of mouth and base of pectoral with irregular plates; barbels none. Outer caudal rays greatly produced; caudal with a longitudinal dark stripe on each lobe. *carinata* 296.

cc. Belly with three series of plates; eye 3 in the interorbital; eight shields between dorsal and occipital; fins spotted; caudal with a dark blotch at its base and another on its posterior margin. D. I, 6; A. I, 5; V. I, 4; P. I, 6; Lat. l. 31-32. (Steindachner.) *kneri* 297.

bb. Margin of snout with bundles of bristles; three longitudinal series of plates on the belly; snout acuminate. Brownish, fins light brown, spotted with darker, upper caudal lobe with a longitudinal stripe. D. I, 6; A. 6. (Kner.) *oxyrrhynchus* 298.

aa. Upper angle of gill-opening equidistant from tip of snout and origin of dorsal; margin of snout granular; eye 4 in interorbital; thorax and belly with two series of large scutes; fins with brown dots. D. I, 6; A. 6; Lat. l. 34. *amazona* 299.

aaa. Upper angle of gill-opening much nearer tip of snout than to origin of dorsal; margin and tip of snout with fine bristles; belly with two series of scutes; fins spotted with darker. D. I, 6; A. I, 5. (Kner.) *acus* 300.

295. Farlowella gladiola.

Acestra gladiolus Günther, Cat. Fish. Brit. Mus. v, 261, 1864 (River Cupai).

Farlowella gladiola Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 33, 1889.

Habitat: Rio Cupai.

296. Farlowella carinata.

Farlowella carinata (Garman) Eigenm. & Eigenm., l. c. 32, 1889 (Santarem; Teffé; Gurupa; Obidos; Jutahy; Tabatinga).

Probably several of the species enumerated under the genus *Farlowella* will prove to be mere synonmys. The characters of the species here described are very variable but the variation does not seem to be in the direction of any of the other species.

Fifteen specimens .10–.22 m. to base of caudal. Santarem; Teffé; Gurupa; Obidos; Jutahy; Tabatinga.

Body little depressed, subterete; tail much depressed; snout long, greatly variable in length in specimens from different localities, the upper margin of the gill-opening equidistant from tip of snout and posterior end of the base of the dorsal fin, or from the posterior margin of the third scute behind the dorsal fin; margin of the snout with finely granular plates or with more coarsely granular plates, each of which has a granular swelling at its center. Temporal plate with coarse, vermiculating ridges. Interorbital flattish.

Orbit 3–3½ in the interorbital. Anterior half of the occipital slightly tumid, the occipital sometimes with obscure X-shaped ridges which are continued as two parallel ridges on the nuchal plates.

Soft parts of the mouth in an oval depression; teeth fine, numerous; barbels obsolete. Region between the mouth and pectoral fins with marginal plates only in the young, wholly covered with irregular polygonal plates in the adult.

Belly with two series of plates, each with a median keel. Anal plate arrow-shaped, a small unpaired plate in front of it; plate before the anal fin elongate. Dorsal plate elongate, separating one or two paired plates; six or seven paired plates between the dorsal plate and the occipital. Sides of the body covered with two series of obscurely keeled plates which coalesce above or slightly behind the anal; 20–22 paired plates between the dorsal and caudal fins.

Distance of the dorsal fin from tip of snout 2⅐–2 in the length; dorsal fin about 3 times as high as long; the first ray highest.

Outermost caudal rays elongate, about as long as the snout, or much longer than the whole head.

Anal fin well developed, inserted under 3d or 4th dorsal ray, little lower than the dorsal fin.

Pectoral fins short, not reaching the ventrals, ventrals not to the anal fin.

Light olivaceous, or dark brown, the rays of all the fins barred; each caudal lobe with a narrow stripe of dark brown, sometimes with a few flecks of light across it; base of caudal sometimes with a large dusky spot.

Length of head to end of occipital plate, $2\frac{7}{8}$–$3\frac{3}{8}$ in the length.

D. 7; A. 6; V. 5; P. 7; lat. l. 30–34.

297. Farlowella knerii.

Acestra knerii Steindachner, Flussfische Südam. iv, 26, pl. vii, figs. 1–1a, 1882 (Canelos, Ecuador); Boulenger, Proc. Zool. Soc. Lond. March, 1887, 278 (Canelos; Sarayacu).

Farlowella knerii Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 34, 1889.

Habitat: Ucayale and Pastasa rivers, eastern slopes of Ecuador and Peru.

298. Farlowella oxyrrhynchus.

Acestra oxyrrhynchus Kner, Panzerwelse, 95, pl. viii, fig. 2, 1853 (Rio Mamore); Günther, Cat. Fish. Brit. Mus. v, 96, 1864 (copied).

Farlowella oxyrrhynchus Eigenm. & Eigenm. l. c. 33.

Habitat: Rio Mamore.

299. Farlowella amazona.

Acestra amazonum Günther, Catal. v, 271, 1864 (Santarem).

Farlowella amazona Eigenm. & Eigenm. l. c. 33.

Habitat: Amazon near Santarem.

300. Farlowella acus.

? *Loricaria scolapacina* Fillippi, "Rev. & Mag. Zool. 156, 1853."

Acestra acus Kner, Panzerwelse, 93, pl. viii, fig. 1 (Caracas); Günther, Catal. v, 261, 1864 (copied).

Farlowella acus Eigenm. & Eigenm. l. c. 34.

Habitat: Caracas.

LXII. HEMIODONTICHTHYS.

Hemiodontichthys Bleeker, Nederl. Tijdschr. Dierk. i, 81, 1863, (*acipenserinus*).

This genus, composed of a single species, is distinguished by its long snout, which is expanded and armed at the tip. The armature of the lateral keels is more marked than in the species of other genera. In the length of its snout this genus approaches *Acestra*, but differs from it in the position of the dorsal fin.

301. Hemiodontichthys acipenserinus.

Hemiodon acipenserinus Kner, Panzerwelse, 92, pl. vii, fig. 2, 1853 (Rio Guaporé, Matogrosso).

Loricaria acipenserina Günther, v, 260, 1864 (copied); Vaillant, Bull. Soc. Philom. Ser. 7, iv, 159, 1880 (Calderon).

Hemiodontichthys acipenserinus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 34, 1889 (Manacapuru; Hyavary).

Habitat: Rio Guaporé; Solimoens; Marañon and tributaries.

Greatly depressed, the depth 2 in the width. Head broad, flat, its depth less than half the length of the snout; occipital with 2 distinct keels which are continued on the nuchal plates; dorsal plate with a median keel; three plates margining the occipital; entire upper surface of the head with longitudinal series of serræ; margin of the head with 3 series of rather large hooks, those of the lowest series strongest and longest; humeral plate with radially arranged interrupted canals. Snout exceedingly long and narrow, turned slightly upward, expanded at the tip, its extremity naked, the upper and lower surfaces with series of serræ, its margin near the tip with several strong hooks.

Orbit with a deep notch behind; eye 4½ in the snout, 8 in the head, 1 in the region between the orbital notches. Lower surface of the head naked.

Teeth minute, present in the lower jaw only; lips rather narrow, the lower faintly papillose. Barbels well developed, their free portion about equal to the diameter of the eye.

The lateral keels stronger than in any other species of *Loricariinæ*.

All the plates in front of dorsal fin more or less carinate. The lateral keels become approximated on the 12th scute.

Region between the pectorals with 5 or more irregular scutes; belly with three series of scutes; anal plate longer than broad, joined to the postanal plates behind, leaving only a narrow naked area.

Distance of dorsal fin from tip of snout 2$\frac{3}{5}$ in the length; the dorsal fin much higher than long; membrane of all the fins exceedingly thin. Dorsal fin inserted behind the last ventral ray; the ventral fins reach about to the anal fin.

Pectoral spine stout, curved, its inner margin serrate, its outer surface with numerous small spines.

Light brown; about 6 dark bars across the back; one across the occiput and another across the eyes; dorsal rays spotted with dark; base of caudal blackish, its rays spotted; anal fin plain; pectorals and ventrals with dusky tips.

Head 3½; D. 8; A. 6; V. I, 5; P. I, 6; Lat. l. 27.

Two specimens .10–.12 m. (to base of caudal). W. James.

Manacapuru; Hyavary.

LXIII. LORICARIA.

Loricaria Linnæus Syst. Nat. ed. x.

>*Loricaria* Bleeker, Nederl. Tijdschr. Dierk. i, 80, 1863 (*dura*=*cataphracta*).

<*Loricaria* Günther, Cat. Fish. Brit. Mus. v.

>*Sturisoma* Swainson, Fishes, Amph. & Reptiles, ii, 1839 (*rostrata*).

>*Hemiodon* Kner, Panzerwelse, 89, 1853 (sp.)

>*Hemiodon* Bleeker, l. c. 82 (*depressus*).

>*Loricariichthys* id. l. c. 80 (*maculatus*).

>*Pseudoloricaria* id. l. c. 80 (*læviuscula*).

>*Parahemiodon* id. l. c. 80 (*typus*).

>*Hemiloricaria* id. l. c. 81 (*caracasensis*).

>*Pseudohemiodon* id. l. c. 81 (*platycephalus*).

>*Rineloricaria* id. l. c. 81 (*lima*).

>*Oxyloricaria* id. l. c. 81 (*barbata*).

Type: *Loricaria cataphracta* Linnæus.

Habitat: Rio Plata to Guiana and Peru; Atlantic and Pacific slopes of Panama.

Species of this genus which at present cannot be classified are:

301.1. *Loricaria platyura* Müller & Troschel, in Schomburgk Reisen in Brit. Guiana iii, 631, 1848 (Rupununi). Upper plates of tail truncate behind; lateral keels approximated on the 13th scute; eye 1½ in interorbital, back with six broad black crossbars; one or more bars on the fins. Lat. l. 29.

301.2. *Hemiloricaria caracasensis* Bleeker, Nederl. Tijdschr. Dierkunde, i, 81, 1863 (Caracas). Lip scarcely fringed, the posterior broad, the anterior narrow. Teeth present. Lower surface with scutes.

301.3. *Loricaria bransfordi* Gill, Proc. Phil. Acad. Nat. Sci. 338, 1876 (Panama).

301.4. *Loricaria cadeæ* Hensel, Wiegm. Arch. i, 369, 1868 (Rio Cadea).

According to the description, this species would be identical with *L. konopickyi* Steindachner. As the localities are so greatly different we have placed it among the doubtful forms.

ANALYSIS OF THE SPECIES OF LORICARIA.

a. Snout long and narrow, much as in *Acestra* or *Hemiodontichthys;* its lower surface granular.

  b. Margin of the head in both sexes granular; teeth minute, or wanting in one or both jaws; lateral keels becoming parallel, not coalescing; no keels on head or on predorsal scutes.

    c. Teeth in the lower jaw only. (HEMIODON.)

      d. Lower surface of head with numerous small plates; eye one in interorbital; orbit with a notch; belly with irregular plates; uppermost caudal ray produced. Head 3⅓–3¼; Lat. l. 27. (Kner.) *depressa* 302.

    cc. Teeth minute, numerous in both jaws; lower surface of the head partly naked; eye 1⅔ in interorbital; orbit without a notch; anterior profile concave; belly with 5 series of plates, uppermost and lowermost caudal rays greatly produced. Head 4½; Lat. l. 33. *panamensis* 303.

bb. Margin of head in males with numerous bristles; teeth well developed in both jaws; lateral keels coalescing; orbit without a notch; lower surface of the head with small plates; belly with 5 series of plates; orbit 2 in interorbital; outermost caudal rays produced. Head without keels; anterior profile concave. Head 4½; Lat. l. 34. (STURISOMA.) *rostrata* 304.

aa. Snout acute or rounded, not produced.

e. Margin of the head in males with numerous bristles, which are very minute in *brevirostris;* teeth well developed; uppermost caudal ray greatly produced; lips not very greatly expanded, fringed or not, without long cirri. (RINELORICARIA.)

f. Orbit without a notch; lower surface of head with numerous small plates; head without keels; loreal region concave; anterior profile slightly concave; belly with 5 series of plates; superciliary margin slightly raised; orbit 3½ in the snout; lips narrow, teeth numerous. *brevirostris* 305.

ff. Orbit notched; lower surface of head naked; uppermost caudal ray produced, filiform; profile convex.

g. A rather large anal plate, bordered anteriorly by three plates; snout more or less pointed.

h. Lower lip two-lobed; occipital with x-shaped keels; mucous pores of the head and anterior part of the body black; all the fins spotted. Superciliary margin raised, nuchal plates strongly bicarinate; granulations of the head arranged in longitudinal series. *lima* 306.

hh. Lower lip fringed; occipital with v-shaped ridges; snout pointed; occipital and nuchal plates in the male with bristles similar to those on the cheeks; all fins faintly spotted. (Steindachner.) *magdalenæ* 307.

gg. Region between ventrals with numerous small plates; snout rather blunt; lower lip fringed; plates of the head striate and furrowed; all fins with indistinct blackish spots; margin of caudal blackish. (Steindachner.) *filamentosa* 308.

ee. Margin of head in both sexes granular or hispid.

i. Plates between ventrals large, more or less firmly connected to form a buckler; a large anal plate.

j. Belly with a single series of plates. (Hancock.) *brunnea* 309

jj. Belly with 3 or more longitudinal series of plates.

k. Head as broad as long; orbital notch very shallow; form greatly depressed; no teeth in the upper jaw; occipital keeled; lower lip with cirri; snout with a median groove; margin of snout and sides of the head with many short spines. Fins reddish. (Kner.) (PSEUDOHEMIODON.) *platycephala* 310.

kk. Head longer than broad. (PARAHEMIODON.)

- *l*. Uppermost caudal ray spinous; vertical diameter of the eye 2 in the interorbital; lower lip emarginate, margined with short cirri; each jaw with 8–10 teeth; no keels on occipital or nuchal plates; belly with about six series of plates. (Kner & Steindachner.) *uracantha* 311.
- *ll*. Uppermost caudal ray not spinous.
  - *m*. Head without keels.
    - *n*. Lateral keels coalescing or becoming approximate.
      - *o*. Lower lip very broad; teeth few, small; snout plain or spotted.
        - *p*. Pectoral conspicuously spotted or barred; spots on caudal, ventral and dorsal rays and posterior half of each interradial membrane of the dorsal; uppermost caudal ray greatly thickened, leathery; orbital notch broad; loreal region concave. *stübelii* 312.
        - *pp*. Pectoral and ventral fins blackish; posterior half of each interradial membrane of the dorsal dusky; orbital notch narrow and deep; loreal region convex. *spixii* 313.
        - *ppp*. All fins plain; caudal equally lobed; orbital notch narrow and deep; belly with 4 series of plates; upper parts with numerous blackish dots. (Bleeker.) *typus* 314.
      - *oo*. Lower lip rather narrow, teeth large and numerous; a rather broad blackish band extends from the eye forward, a narrower one downward; base of caudal and a bar parallel to its margin blackish; orbital notch narrow; snout acute; belly with 5 longitudinal series of scutes. *phoxocephala* 315.
    - *nn*. Lateral keels remaining separate to or nearly to the caudal; head high, its sides steep; orbital notch narrow and deep; lips thick, papillose; no teeth in the upper jaw; interorbital flattish. *anus* 316.
  - *mm*. Head with keels, at least on the occipital. (LORICARIICHTHYS.)
    - *q*. Tip of lower caudal lobe blackish; ventrals and pectorals dusky.
      - *r*. Orbit with a large angular notch, almost or quite as large as the orbit; anal plate rounded in front, margined by 3 plates; lips broad, edged with black; teeth smaller and numerous. *acuta* 317.
      - *rr*. Orbital notch parabolic or more or less angular; anal plate attenuate in front, usually margined by 2 plates; lips broad, plain; teeth few, minute.· *maculata* 318.
    - *qq*. Margin of caudal light; head and nape arched above; head less than 5 in the length.

s. Dorsal rays spotted, snout pointed, upper portion of head very rough; orbit with a shallow triangular notch; shields of the anterior portion of the body down to the belly keeled; lower lip rounded, strongly papillose; lateral keels united on the 15th plate; lat. l. 29. (Steindachner) ***konopickyi* 319.**

ss. Dorsal, pectorals and ventral each with a broad black band; teeth very fine, few, $\frac{5+5}{7+7}$; horizontal diameter of orbit with notch 1½ in interorbital. (Günther.) ***lanceolatus* 320.**

qqq. Margin of caudal black; pectorals, ventrals and anal, each with a broad dark band; two dusky spots on upper lip; orbital notch narrow, deep; lips narrow; teeth rather large, numerous; belly with 5 series of plates; outer ventral ray prolonged. ***teffeana* 321.**

ii. Plates between ventrals small; a large anal plate; orbit with a shallow notch; eye ¾–½ in interorbital; upper lip with a fringe of cirri. Head and body with black spots; head short, high, anterior profile steep, straight; pectorals falcate; outer ventral ray produced. (PSEUDOLORICARIA.) ***læviuscula* 322.**

iii. Plates between ventrals, if present, small; no large anal plate. (LORICARIA.)

t. Belly at least partially naked; lower lip with numerous cirri and marginal fringes.

u. Belly with the middle line and sides armed; teeth few, small; an occipital keel; upper surface with numerous narrow light and dark lines; all fins but the anal spotted with violet. (Steindachner.) ***variegata* 323.**

uu. Belly with a median naked area; the breast and ventral region with small plates; head broader than long to upper angle of gill-opening; teeth in both jaws of the same size and number; eye small, 5½ in the snout almost 2 in the interorbital; orbital notch very shallow; occipital with two keels; all fins but the anal spotted with black. (Kner.) ***macrodon* 224.**

uuu. Belly entirely naked; eye 7 in head, 4 in snout, 2 in interorbital; head without keels. (Cuv. & Val.) ***nudiventris* 325.**

tt. Belly entirely armed in adult.

v. Lower lip with numerous cirri.

w. Orbit with a shallow notch.

x. Barbel short; margin of head convex, entirely granular; anterior profile convex.

y. Width at origin of anal equals the length of the snout; width of head less than its length to upper angle of gill-opening; occipital with very strong keels. ***cataphracta* 326.**

yy. Width at origin of anal equal to snout and orbit; width of head greater than its length to upper angle of gill-opening; posterior half of occipital with two indistinct keels. *lata* 327.

xx. Barbels extending beyond base of pectoral; margin of snout concave; small teeth in both jaws; horizontal diameeter of eye not quite equal to interorbital; lateral keels approximated on the 18th scute; thorax and belly with small scutella; upper caudal ray produced. (Günther.) *macromystax* 328.

ww. Orbit without a notch; eye 5 in the snout, 9 in the head; dorsal, pectoral and ventral spotted. (Cuv. & Val.) *vetula* 329.

vv. Lower lip with marginal cirri only; head and body excessively depressed, the width of the head much greater than its length to upper angle of gill-opening; teeth few, minute; orbit with its notch 1⅓ in the interorbital; occipital and nuchal plates bicarinate; lateral keels prominent, approximated on the 16th scute; upper caudal ray slightly produced. Olive green, head with vermiculating lines, back with whitish spots. Head 4⅔. Lat. l. 31. (Günther.) *lamina* 330.

vvv. Lower lip papillose, without cirri; width of head about equal to its length to upper angle of gill-opening; teeth very numerous and fine; orbit without a notch, its diameter 1⅓ in interorbital; scutes smooth; lateral keels obtuse, approximated on the 21st scute; dorsal falcate, the length of the first ray greater than its distance from the snout; outer rays of all fins somewhat prolonged. Head 5. Lat l. 29. (Günther.) *platystoma* 331.

302. Loricaria depressa.

Hemiodon depressus Kner, Panzerwelse, 91, pl. vii, fig. 1 (Rio Negro; Marabitanos).

Loricaria depressa Günther, v, 259, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 34, 1889.

Habitat: Rio Negro.

This species is known only from the types.

303. Loricaria panamensis.

Loricaria panamensis Eigenm. & Eigenm. l. c. (Panama.)

Habitat: Panama.

Type No. 8126; one specimen .95 m. to base of caudal. Panama. Dr. Hernberg.

Closely related to *L. rostrata* Spix.

Body little depressed. No keels on the head or on the nuchal plates. Shields and scutes hispid; a large naked area about the mouth.

Orbit without a notch, 4 in the snout, 7 in the head, 1⅔ in the interorbital.

Teeth fine, numerous in both jaws.

Five series of plates on the belly; anal plate as long as broad; lateral keels remaining distinct to the caudal fin, approximated at about the 16th lateral scute.

Distance of dorsal fin from end of snout 3⅗ in the length; first dorsal ray very high, little less than its distance from tip of snout.

Caudal forked, the outermost rays greatly produced, the upper filament about equal to the length from tip of snout to its base, the lower somewhat shorter. First anal ray little less than length of head. Ventral fins reaching to the end of the base of the anal fin; pectorals to the vent.

Brownish; dorsal fin dark brown on its first and second membranes and second ray, its other rays spotted; base of caudal fin and a longitudinal stripe on each lobe dark brown; other fins plain; a large blackish area in front of each eye.

Head 4½; D. 8; A. 6; V. I, 5; P. I. 6; Lat. l. 33.

304. Loricaria rostrata.

Loricaria rostrata Spix, Gen. et Spec. Pisc. 5, plate iii, fig. 1-2, 1829 (Rivers of Brazil); Cuv. & Val. xv, 478, 1840 (copied); Kner, Panzerwelse, 83, 1853 (Rio Branco); Günther, v, 256, 1864 (copied); id. Proc. Zool. Soc. Lond. 1868, 235 (Xeberos); Peters, MB. Ak. Berl. 1877, 471 (Calabozo); Cope, Proc. Am. Philos. Soc. xvii, 681, 1878 (Peruvian Amazon); Steindachner, Flussfische Südam. i, 17, 1879 (Mamoni River); Vaillant, Bull. Soc. Philom. Series 7, iv, 156 (Calderon); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 35, 1889 (Manacapuru).

Loricaria acuta Cuv. & Val. xv, pl. 452, 1840 (not described).

Loricaria barbata Kner, Panzerwelse, 87, pl. v, 1853 (Cujaba—Fluss.); Günther, v, 257, 1864 (copied).

Habitat: Upper course of the Paraguay; Solimoens; Marañon and tributaries westward; Panama; Calabozo.

Body little depressed anteriorly, its depth 1½ in its width. Depth of the head little more than half the length of the snout; head without keels or ridges, its surface and all the plates evenly hispid; transverse profile of the occiput regularly convex; occipital terminating in a triangular process which is margined by a single nuchal plate; the nuchal plates indistinctly bicarinate.

Orbit without a notch, 4⅓ in the snout, 7½ in the head, 2 in the interorbital.

Anterior profile greatly concave, the snout long and narrow; margin of the head with fine, erectile bristles. Teeth fine, numerous, well developed in both jaws; upper lip granular, lower lip entire, rounded, thickly papillose. Free portion of the barbel not as long as the orbital diameter.

Breast and lower surface of the head covered with numerous irregular plates; belly with 5 series of plates, the outer ones broadest. The two lateral keels moderate, coalescing into one keel at about the 20th scute, the upper obsolete in front. Distance of the dorsal fin from tip of snout 3 in the length; anterior dorsal ray high, longer than the head. Caudal emarginate, the outermost rays greatly produced, about 3 in the length.

Anal about as high as the ventral fins, which are inserted slightly in front of the dorsal fin, the outer rays thickened and slightly hispid; pectorals similar, their tips reaching little beyond origin of the ventrals.

Brownish, lighter below; rays of the dorsal, caudal, pectoral and sometimes ventrals, spotted with darker.

Head 4½; D. 8; A. 6; V. I, 5; P. I, 6; Lat. l. 34.

Two specimens .19–.21 m. (to base of caudal). Manacapuru. W. James.

305. Loricaria brevirostris.

Loricaria brevirostris Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 35, 1889 (Iça).

Type: No. 8,095; one specimen ♂, .21 m. to base of caudal. Iça. W. James.

Body little depressed anteriorly, its depth 1½ in its width. Depth of the head 1½ in the snout. Head without keels or ridges, its surface and that of all the plates hispid; transverse profile of the occiput regularly convex.

Orbit without a notch, 3½ in snout, 7 in head, 2 in interorbital.

Anterior profile little concave; snout triangular, acute, little longer than the rest of the head. Margin of the head with minute movable bristles. Teeth fine, numerous, well developed in both jaws; upper lip granular, lower lip entire, rounded, thickly papillose.

Breast and lower surface of the head with numerous irregular plates; belly with 5 series of plates.

Lateral keels coalescing into one keel at about the 20th scute; the upper keel obsolete in front. Distance of dorsal fin from tip of snout slightly more than 3 in the length. First dorsal ray longer than the head. Rays of the dorsal and caudal faintly spotted, other fins plain. D. 8; A. 6; V. I, 5; P. I, 6; Lat. l. 34.

306. Loricaria lima.

Loricaria lima Kner, Panzerwelse, 89, pl. vi, fig. 1, a. b. 1853 (Brazil); Günther, v, 260, 1864, (copied); id. Fish. Centr. Am. 393, 1866 (Atlantic and Pacific slope of Panama); Hensel, Wiegm. Arch. 1868, i, 366 (Stony brooks near Santa Cruz); Lütken, Velhas Flodens Fiske, 138, 1875 (Rio das Velhas); Steindachner, Flussfische Südam. iii, 6, pl. i, 1881 (Rio Parahyba; Rio Macacos; Rio Preto; Rio Quenda; Rio das Velhas); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 35, 1889 (Mendez; Santa Cruz; Rio Quenda; Rio Parahyba; Campos; Macacos).

? *Loricaria strigilata* Hensel, Wiegm. Arch. 1868, i, 368 (Stony brooks near Santa Cruz) = ♂.

Habitat: Coast rivers from Rio Parahyba to Rio Para; Atlantic and Pacific slopes of Panama.

Depressed, elongate, the depth about 2 in the width. Head long, tapering; the cheeks of the male thickly covered with fine bristles, of the female slightly hispid; plates of the head with longitudinal series of small serræ;

occipital with two ridges which widen backward and are continued upon the nuchal plates; two nuchal plates between the occipital and the dorsal plate with a deep median depression; occipital truncate behind, margined by three plates; superciliary margins raised, the interorbital concave.

Orbit with a rather large notch behind; eye 4 in the snout, 7½ in the head, 1½ in the interorbital.

Anterior profile convex. Teeth few, well developed in both jaws. Margin of the lips fringed, short cirri covering the surface of the lips. Free portion of the barbel about equal to the orbital diameter.

Lower surface of the head naked; belly with 3–5 series of scutes; anal plate narrowest forward, emarginate behind.

Lateral keels coalescing on about the 16th lateral scute. Anterior canals and pores of the lateral line dark purplish. Pectoral pore minute.

Distance of the dorsal fin from tip of snout 3¼ in the length; dorsal fin about ⅓–½ higher than long.

Caudal slightly emarginate, the upper ray produced, 2⅓ in the length. Ventrals short, not reaching to the anal; pectorals about to the ventrals.

Back marbled, and with traces of about 4 dark cross bars; mucous pores of the head and anterior portion of the body dark purple; all the fins spotted, the anal least; base of caudal dusky; tips of caudal and dorsal sometimes blackish, the anal sometimes with a dusky bar.

Head 4⅔; D. 8; A. 6; V. I, 5; P. I, 6; Lat. l. 27–28.

Twenty-eight specimens, .10–.17 m. to base of caudal. Mendez; Santa Cruz; Rio Quenda; Rio Parahyba; Campos; Macacos.

307. Loricaria magdalenæ.

Loricaria magdalenæ Steindachner, Fisch-fauna des Magdalenen. Stromes, 59, 1878 (Magdalen River); id. Denk. Ak. Wien, xli, pl. vii, fig. 2 and 3; Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 36, 1889.

Habitat: Magdalena River.

308. Loricaria filamentosa.

? *Loricaria bransfordi* Gill, Proc. Acad. Nat. Sci. Philad. 1876, 338 (Panama).

Loricaria filamentosa Steindachner, Fisch-fauna des Magd. Stromes, 29, pl. ix, 1878 (Magdalen River); id. Fisch-fauna des Cauca and Flüsse bei Guayaquil 13, 1880 (Cauca); Boulenger, Proc. Zool. Soc. Lond. March, 1887, 277 (Canelos); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 36, 1889.

Habitat: Canelos; Magdalena River.

309. Loricaria brunnea.

Loricaria brunnea Hancock, Zool. Journ. iv, 247, 1828 (Demarara); Cuv. & Val. Hist. Nat. Poiss. xv, 479, 1840 (copied); Günther, v, 260, 1864 (copied); Eigenm. & Eigenm. l. c. 37.

Habitat: Demarara.

310. Loricaria platycephala.

Hemiodon ? platycephalus Kner, Panzerwelse, 89, pl. vi, fig. 2, 1853 (Rio Cujaba).

Loricaria platycephala Günther, v, 258, 1864 (copied); E. & E. l. c.

Habitat: Rio Cujaba.

311. Loricaria uracantha.

Loricaria uracantha Kner & Steindachner, Abh. Bayr. Akad. Wiss. xi, Abth. 56, pl. 6, fig. 3, 1865 (New Grenada; Rio Chagres); Günther, Fish. Cent. Am. vi, 393 & 478, 1866 (Atlantic and Pacific rivers of Panama); Eigenm. & Eigenm. l. c.

Habitat: Atlantic and Pacific slopes of Panama.

312. Loricaria stübelii.

Loricaria stübelii Steindachner, Flussfische Südam. iv, 7, pl. iii, figs. 2-2*b*, 1882 (Rio Huallaga); E. & E. Proc. Cal. Acad. 2d Ser. ii, 37, 1889 (Santarem; Hyavary; Teffé; Rio Preto; Rio Puty).

Habitat: Amazons, Rio Preto and Rio Puty.

This species is closely related to *L. maculata* Bloch, to *L. spixii*, and to *L. acuta* Valenciennes. It is most readily distinguished by its profusely spotted fins and more rounded snout.

Depth a little less than 2 in the width. Head short and broad, its depth 2 in its width, which is little less than its length to upper angle of gill-opening; head without ridges or keels, occipital region regularly convex; occipital terminating in a broad, triangular process which is margined by 2 nuchal plates; interorbital slightly concave; snout broad, rounded, its entire margin narrowly naked.

Orbital notch large, similar to that of *L. maculatus*, diameter of orbit with its notch 4½–5 in the head. Eye 3¼–4¼ in snout, 6½–9 in head, 1½–2 in the interorbital.

Lower surface of head naked except a narrow marginal band.

Teeth few, minute, in both jaws. Lower lip and the sides of upper lip slightly fringed; the male with the lower lip greatly expanded, reaching beyond base of pectoral fins.

Anal plate pointed in front, margined by 2–4 plates; belly with 3–5 series of plates; breast with smaller plates of irregular shape; nuchal plates faintly bicarinate. Lateral keels prominent, remaining separate throughout, approximated on the 17th or 18th plate.

Distance of dorsal fin from tip of snout 3 in the length; first dorsal ray about equal to length of head. Caudal obliquely truncate, the upper lobe longer. Anal lower than the ventral; third ventral ray highest, reaching beyond origin of anal.

Pectoral short, reaching to ventrals.

Brown, mottled with darker on the back; a series of blotches between the lateral keels; posterior half of each inter-radial dorsal membrane dusky, spotted with darker. Caudal spotted with black, anal plain or somewhat spotted; pectorals and ventrals dusky or blackish, the upper surfaces profusely spotted with darker, the spots usually forming cross-bars.

Head 4⅓–4; Lat. l. 30–31.

Fourteen specimens .10–.25m. Santarem; Hyavary;

Teffé; two specimens, No. 8105, from the Rio Preto .15–.20 m., and three specimens, No. 8103, from the Rio Puty .17–.21 m. differ from typical examples in having a more angular orbital notch, and the fins, especially the pectorals and ventrals, much less spotted.

313. Loricaria spixii.

Loricaria spixii Steindachner, Flussfische Südam. iii, 4, pl. ii, 1881 (Rio Parahyba; Santa Cruz; Rio Muriahe; Sao Matheos; Sambaia; Rio Grande do Sul); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 37, 1889 (Santa Cruz; Rio Quenda; Sambaia; Mendez; Campos; Muriahe; Sao Matheos).

Habitat: Southeastern Brazil.

Depth of the body 1½–1⅔ in its width. Head long, parabolic; transverse profile of the occiput gently arched; occipital terminating in an attenuate occipital process which is margined by two or three nuchal plates. Interorbital flattish, loreal region and anterior profile convex, the anterior margin of the snout naked, the naked area margined by a narrow granular band below. Occipital without keels. Surface of the head and scutes of body hispid.

Orbit with a triangular notch of moderate size. Orbital diameter without its notch, 3–3½ in the snout, 6½–7 in the head, 1½–1¾ in the interorbital. Lower surface of the head and snout naked except the narrow marginal band.

Both jaws with a few minute teeth. Upper lip and barbels fringed; lower lip of moderate width in females, greatly expanded and reaching beyond the gill-openings in males.

Breast covered with plates of irregular shape; middle of belly with 3–4 series of plates; a large anal plate usually margined in front by 2–3 plates which are attached to a row of smaller plates in front; these, with the anal plate, form a ventral buckler. Nuchal plates obscurely bicarinate; lateral keels remaining distinct but approximated near the 22d scute, thence running parallel to the caudal.

Lateral line complete, composed anteriorly of two pores at the margin of each lateral scute.

A small pectoral pore.

Distance of dorsal fin from tip of snout 3 in the length; first dorsal ray highest, a little shorter than the head, the last ray less than half as long as the first. Caudal emarginate, the upper lobe longer. Anal well developed, as high as the ventral and pectoral. Ventrals reaching slightly beyond origin of anal, pectorals beyond origin of ventrals.

Dusky above, lighter below; dorsal fin with the posterior half of each inter-radial membrane and the tip blackish, the anterior half of the membrane transparent; tip of caudal dusky, the rays indistinctly spotted; tip of anal somewhat spotted; pectoral and ventral fins blackish; upper lip and lower surface of lower lip dark violet.

Head $4\frac{1}{5}$–$4\frac{2}{5}$; D. 8; A. 6; V. I, 5; P. I, 6; Lat. l. 30.

Thirty specimens .19–.30 m. Santa Cruz; Rio Guenda; Sambaia; Mendez; Campos; Muriahe; Sao Matheos.

314. Loricaria typus.

Parahemiodon typus Bleeker, Silures de Suriname, 20, pl. vi, fig. 1 and xiii, fig. 1 (Surinam).

Loricaria typus Eigenm. & Eigenm. l. c.

Loricaria hemiodon Günther, v, 258, 1864 (copied).

Habitat: Surinam.

315. Loricaria phoxocephala.

Loricaria phoxocephala Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 37, 1889 (Coary).

Types: No. 8030; two specimens .14–.15 m. to base of caudal. Coary.

This species can readily be distinguished by its pointed snout and by the black bars on the head.

Head long, pointed, the snout acute; depth of the head $1\frac{3}{5}$ in its width; occipital with scarcely evident keels; interorbital convex; anterior profile concave; tip of snout naked. A narrow orbital notch. Eye 3⅔ in snout, 7 in the head, 1⅔ in the interorbital.

Lower surface of head naked; teeth numerous and well developed in both jaws; thoracic plates small, the anterior margin of the mailed region truncate, extending to the gill-openings; fine longitudinal series of ventral plates; anal plate and the plates anterior to it as in *L. teffeana*; nuchal plates obscurely bicarinate; lateral keels becoming more or less entirely coalesced on the fifteenth plate.

Distance of dorsal fin from tip of snout 3⅓–3⅙ in the length; first dorsal ray higher than length of head; outermost caudal rays produced; anal fin higher than ventrals or pectorals.

Light brown with six broad cross-bands, the first on the nape, the second under origin of dorsal fin; a dark band extending forward from eye, a narrower one downward; head and anterior portion of body with black pores; dorsal slightly dusky, obscurely spotted, its base with a few spots; base of caudal and a band parallel to its margin dark brown; anal and ventral fins light; pectoral similar to the dorsal.

Head 4⅞–5; Lat. l. 29.

316. Loricaria anus.

Loricaria anus Valenciennes, Voy. d'Orb. ix, atlas ii, pl. vi, fig. 1, 1847; Cuvier & Valenciennes, xv, 470, 1840 (Buenos Ayres); Günther, Catal. v, 258, 1864 (copied); Hensel, Wiegm. Arch. 1870, 77 (locality ?); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 38, 1889 (Rio Grande do Sul).

Habitat: Rio Plata and its tributaries.

Depth 1½–1⅔ in the width. Surface of the head and scutes of the body slightly hispid. Head long, pointed, its depth 2⅕–2⅖ in its length; occipital without keels, with a triangular process which is margined by two nuchal plates, its apex touching a third plate; interorbital flattish, a shallow groove extending backward from the nares. Margin of snout naked.

Orbit with a triangular notch on its posterior rim, which is ½ as long as the orbit; diameter of orbit without notch, 3¾ in the snout, 8 in the head, 1¾ in the interorbital.

Lower surface of the head naked except a narrow marginal band.

No teeth in the upper jaw; lower jaw with a few minute teeth. Upper lip rather coarsely fringed, lower lip broad, covered with thick papillæ.

Anal plate joined to the plates preceding it, forming a subtriangular buckler. Nuchal plates inconspicuously bicarinate. Lateral keels remaining separate to the caudal but becoming approximated on the 25th lateral scute. Tail with a median depression above and below.

Distance of dorsal fin from tip of snout 2⅔ in the length; first dorsal ray highest, 1⅖ in the head. Caudal emarginate, upper lobe a little the longer. Anal rounded, lower than the ventrals. Third ventral ray highest, reaching slightly beyond origin of anal; pectoral reaching to base of ventral.

Color uniform dark brown.

Head 3½–3⅘; D. 8; A. 6; V. I, 5; P. I, 6.

Two specimens .28–.33 m. Rio Grande do Sul. Dom Pedro II.

317. Loricaria acuta.

Loricaria acuta Cuv. & Val. Hist. Nat. Poiss, xv, 472 (?Brazil); Kner, Panzerwelse, 85, 1853 (Barra do Rio Negro); Günther, v, 258, 1864 (copied); Vaillant, Bull. Soc. Philom. Ser. 7, iv, 159, 1880 (Calderon); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 38, 1889 (Villa Bella; Lake Hyanuary; Cudajas; Manaos, on the Rio Negro; Xingu Cascade; Lago Alexo; Obidos; Coary; Teffé.)

? *Loricaria castanea* Castelnau, Anim. Amérique du Sud, 46, plate xxiii, fig. 4, 1855 (Rio de Janeiro.)

? *Loricaria maculata* Günther, Catal. v, 257, 1864 (British Guiana; Surinam).

Habitat; Amazons and northward.

This species is closely related to *Loricaria maculata* Bloch and to *L. spixii* Steindachner, but is readily distinguished by the large, angular, orbital notch, by the broad, black margined lower lip, by the teeth and by the anal plate.

Depth about 1½ in the width. Head long, narrow, depressed, its depth 1⅔–2 in its width; postorbital region flattish, the occipital with two distinct keels in the young, which become more or less obsolete in the old; the occipital ends in an attenuated process which is margined by three nuchal plates; interorbital concave, the superciliary margins being slightly raised. Snout long, pointed; a narrow naked strip at its tip.

Orbit with a large, angular, rhomboidal notch, the diameter, including the notch, 4 in the head; diameter of the eye 3½ in the snout, 7½ in the head, 1 in the space between the orbital notches. Lower surface of the head naked, the lower lip greatly expanded, entirely covering the naked portion. Teeth small, numerous, well developed.

A large, elongate anal plate, broadly rounded in front, margined by three large plates, together forming a large ventral buckler. Belly with three series of plates; breast with numerous smaller plates. Nuchal plates bicarinate; lateral keels strong, remaining distinct, approximated on about the nineteenth lateral scute. Surface of the anterior scutes and of the head with longitudinal series of small spines.

Distance of dorsal fin from tip of snout 2⅚–3 in the length, first dorsal ray about as high as the length of the head. Caudal emarginate. Anal fin large, its first ray little lower than the dorsal. Ventrals lower than the anal, reaching to or little beyond origin of the anal fin. Pectorals less than the ventrals, about reaching the latter.

Head obscurely spotted with dark; body marbled; dorsal rays spotted with dark, the spots extending upon the membrane in front of each ray; caudal rays spotted, the tips of the lower rays blackish; anal rays spotted; pectoral and ventral fins dusky, indistinctly spotted, nearly black in the male; breast blackish (in the male); margin of lips black.

Head $4\frac{1}{2}$–$4\frac{1}{3}$; D. I, 7; A. 6; V. I. 5; P. I, 6; Lat. l. 31.

Over thirty specimens .06–.26 m. to base of caudal. Villa Bella; Lake Hyanuary; Cudajas; Manaos on the Rio Negro; Xingu Cascade; Lago Alexo; Obidos; Coary; Teffé.

318. Loricaria maculata.

Loricaria maculata Bloch, Ausl. Fische viii, 73, pl. 375, fig. 1; Lacépède, Hist. Nat. Poiss. v, 140, 1803 (South America); Cuv. & Val. xv, 473 (loc. ?); Kner, Panzerwelse, 80, 1853 (Rio Guaporé; Matogrosso; Surinam); Vaillant, Bull. Soc. Philom. series 7, iv, 157, 1880 (Calderon); Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. ii, 38, 1889 (Coary; Santarem; Iça; Hyavary; Obidos; Teffé; Jutahy).

Loricaria cirrhosa var. *maculata* Bloch & Schneider, Syst. Ichthyol. 125, 1801.

Plecostomus maculatus Swainson, Fishes, Reptiles, etc. ii, 304, 1839.

Loricariichthys maculatus Bleeker, Silures de Suriname, 16, 1864 (Surinam).

Loricaria amazonica Castelnau, Anim. Amérique du Sud. 46, plate xxiii, fig. 2, 1855 (Amazon).

Plecostomus cataphractus Gronow, "Cat. Fish. 158," 1854.

Habitat: Rio Guaporé; Calderon; Surinam.

Depth $1\frac{4}{5}$–$1\frac{1}{2}$ in the width. Head long, depressed, its depth about 2 in its width; occipital with two keels, margined posteriorly by three plates; interorbital concave; snout depressed, acute, most so in the young, its margin turned upward slightly and narrowly naked in the adult. Orbital notch rather shallow, parabolic, rarely somewhat angular; diameter of orbit with the notch $4\frac{1}{2}$–5 in the length of the head. Eye $2\frac{1}{2}$–$3\frac{3}{4}$ in the snout, $5\frac{3}{4}$–7 in the head, $1\frac{2}{5}$–$1\frac{1}{3}$ in the interorbital.

Lower surface of the head naked except a narrow marginal band.

Teeth few, minute in the upper jaw, similar teeth but more numerous in the lower jaw. Margin of upper lip slightly fringed, lower lip rounded.

Anal plate pointed in front, margined by 2, rarely 3, anal plates; belly with 3 series of plates; breast with irregular smaller plates. Nuchal plates bicarinate. Lateral keels prominent, remaining distinct, becoming approximated on the 16th or 17th scute. Surface of the head and of the anterior scutes with longitudinal series of small spines.

Distance of dorsal fin from tip of snout about 3 in the length; first dorsal ray about 1¼ in length of head. Caudal fin emarginate, the uppermost ray slightly produced. Anal about as high as the ventrals; ventrals higher than the pectorals, reaching beyond origin of the anal; pectorals about to the ventrals.

Back with five dark cross bands; dorsal rays spotted, the spots extending upon the membranes in front of each ray, tips dusky; margin of lower caudal lobe blackish, the rays spotted, base of caudal dusky; anal plain; ventrals slightly dusky; pectorals much darker.

Head 4–4⅓; D. 8; A. 6; V. I, 5; P. I, 6; Lat. l. 28–29.

Twenty-five specimens .075–.17 m. Coary; Santarem; Iça; Hyavary; Obidos; Teffé; Jutahy.

319. Loricaria konopickyi.

Loricaria konopickyi Steindachner, Denk. Ak. Wien, xli, 45, pl. vii, 1879 (Amazon); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 39, 1889.

Loricaria valenciennesi Vaillant, Bull. Soc. Philom. Ser. 7, iv, 157, 1880 (Calderon).

Habitat: Amazon; Calderon.

320. Loricaria lanceolata.

Loricaria lanceolata Günther, Proc. Zool. Soc. Lond. 1868, 235, fig. 3 (Xeberos); Boulenger, Proc. Zool. Soc. Lond. March, 1887, 277 (Canelos); Eigenm. & Eigenm. l. c.

Habitat: Xeberos; Canelos.

321. Loricaria teffeana.

Loricaria teffeana Steindachner, Denk. Ak. Wien, lxi, 44, pl. vi, 1879 (Amazon, near Teffé); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 39, 1889 (Cudajas; Tonantins; Teffé; Jutahy; Lago Alexo; Tabatinga).

Habitat: Solimoens.

Depth $1\frac{3}{5}$–$1\frac{2}{5}$ in the width. Head depressed, its depth 2 in its length to upper angle of gill-opening, its width equal to its length to upper angle of gill-opening. Occipital with two parallel ridges in the young, which diverge in the adult.

An orbital notch of moderate size. Eye $2\frac{1}{2}$–$3\frac{1}{2}$ in snout, $5\frac{1}{2}$–7 in the head, $1\frac{1}{2}$–$1\frac{1}{3}$ in the interorbital. Snout moderately acute, its tip with a narrow naked space. Teeth numerous, well developed; lower lip fringed with rather long cirri. Breast with numerous small plates; five longitudinal series of plates on the belly; a rather large anal plate, bordered anteriorly by 3 plates, these three by 5 others. Nuchal plates bicarinate; lateral keels uniting more or less completely on the 15th lateral scute.

Distance of dorsal fin from tip of snout $3\frac{1}{4}$–$3\frac{3}{4}$ in the length; first dorsal ray higher than length of head. Upper caudal ray produced, about $2\frac{1}{3}$ in the length. Height of anal, pectoral and ventral fins about equal, the first ray of each thickened.

Pores of the head blackish, a series of six surrounding the eye, one pore near the anterior tip of the occipital plate, other pores above the gill-opening and above the nares.

Color very variable: dark brown in young with six blackish cross bands, the first and last narrowest; outermost caudal rays spotted, the rest of the fin black; tip of dorsal fin black, the rays spotted; anterior rays of the anal, ventral and pectoral spotted; two brownish spots on the upper lip. Specimens .14 m. to base of caudal are less black, the caudal is dark brown with one or more light cross bars; anal, ventral and pectoral with faint dusky bars. Specimens .16 m. to base of caudal have indistinct spots on the dorsal surface, the spots being most conspicuous on sides of head; dorsal spotted; base and margin of caudal blackish, the central portion of the fin spotted; a dark oblique cross band on the anal fin; a blackish spot on the plate on either side at base of anal fin; ventrals similar to the anal; pectorals dusky, a darker cross band faintly indicated.

Head 5–5½ D. 8; A. 6; V. I, 5; P. I, 6; Lat. l. 29.

Twelve specimens .08–.17 m. Cudajas; Tonantins; Teffé; Jutahy; Lago Alexo; Tabatinga.

Two specimens, No. 8079 .06 m. to base of caudal from Jutahy have the lateral keels more or less distinct throughout, the dorsal surface everywhere with light reticulations.

322. Loricaria læviuscula.

Loricaria læviuscula Cuv. & Val. xv, 476, 1840 (loc.?); Kner, Panzerwelse, 81, pl. iii & pl. i, 1853 (Barra do Rio Negro; Rio Branco; Marabitanos); Günther, v, 256, 1864 (River Capin); Vaillant, Bull. Soc. Philom. series 7, iv, 156, 1880 (Calderon); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser, ii, 37, 1889 (Rio Madeira; Rio Trombetas; Coary; Jutahy; Porto do Moz; Fonteboa; Gurupa; Manaos; Lake José Assu; Silva, Lake Saraca; Xingu; Tonantins; Hyavary).

Habitat: Amazon, Solimoens, and tributaries from Para to Tabatinga.

This species is very variable but is readily recognized by the large eye, the narrow interorbital, and the spotted appearance.

Depressed, the depth 1⅔ in the width; caudal portion of the body with a median dorsal depression; posterior part of the head depressed. Anterior profile rapidly descending; depth of the head 2 in its width; occipital ending in a triangular process, margined by two nuchal plates. Head without distinct ridges or keels; 2 obscurely bicarinate nuchal plates; head and all the scutes minutely granular. Superciliary edges raised, interorbital narrow, the loreal region convex.

Orbit with a shallow notch behind.

Eye 2½–4 in the snout, 5–7 in the head, ½–¾ in the interorbital. Snout pointed, its margin and tip granular.

Lower surface of snout and head naked. Teeth well developed, numerous in both jaws; upper lip with a fringe of long cirri; lower lip closely covered with larger and smaller papillæ in the female, short in the male, covering the entire under surface of the head. Barbels fringed, the free portion about equal to an orbital diameter.

Sides of the belly with a series of rather large scutes, a large anal plate, the central portion of the belly entirely covered with small scutes in the adult, entirely naked in the young (.065 m.), with two median series of scutes in example .10 metre long. The anal plate in the adult is bordered in front and laterally by a series of small plates which are larger in the ♂ than in the ♀.

Lateral keels scarcely developed, coalescing on about the 25th scute.

No pectoral pore.

Distance of the dorsal fin from tip of snout 3⅙–3⅓ in the length; dorsal fin about twice as high as long. Caudal emarginate, its outer rays scarcely produced.

Anal fin well developed. Ventral fins emarginate, the 3rd and 4th rays higher than the 1st and 2nd, the spine produced, reaching base of anal.

Pectorals emarginate, reaching beyond base of ventrals.

Head and body with small roundish dark spots, those on the tail arranged in series, one along the median line of back, one between the dorsal and lateral plates, another between the lateral keels; the spots more conspicuous in the female than in the male; the fins similarly spotted except the anal and sometimes the ventrals; tip of dorsal sometimes smutty; young with about six dark cross-shades on the back; a jet black spot on base of caudal, its tip dusky.

Head $4\frac{1}{3}$–$4\frac{1}{2}$; D. 8–9; A. 6; V. I, 5; P. I, 6; Lat. l. 32.

Forty specimens .06–.30 m. Rio Madeira; Rio Trombetas; Coary; Jutahy; Porto do Moz; Manaos; Fonteboa; Lake Jose Assu; Gurupa; Silva, Lake Saraca; Xingu; Tonantins; Hyavary.

323. Loricaria variegata.

Loricaria variegata Steindachner, Flussfische Südam. i, 15, pl. iii, 1879 (Mamoni River, near Chepo); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 36, 1889.

Habitat: Mamoni River.

324. Loricaria macrodon.

Loricaria macrodon Kner, Panzerwelse, 79, pl. ii. 1853 (Cujaba); Günther, Cat. Fish. Brit. Mus. v, 255, 1864 (copied); Hyrtle, Denk. Ak. Wien, xvi, 18, 1859 (Vertebræ 1+27); E. & E. l. c.

Habitat: Cujaba.

325. Loricaria nudiventris.

Loricaria nudiventris Cuv. & Val. Hist Nat. Poiss. xv, 469, 1840 (Rio San Francisco); Günther, Cat. Fish. Brit. Mus. v, 256, 1864 (copied); Eigenm. & Eigenm. l. c.

Habitat: Rio San Francisco.

326. Loricaria cataphracta.

Loricaria dura Linnæus, "Mus. Ad. Fred. 79, pl. 29, figs. 1 and 2;" Bleeker, Silures de Suriname, 18, 1864 (Surinam).

Loricaria cataphracta Linnæus, Systema Naturæ, ed. x, 307, 1758; id. l. c. ed. xii, 508, 1766 (America); Bloch, Ausl. Fische, viii, 76, pl. 75, figs. 3 and 4; Cuv. & Val. xv, 459 (Surinam, Cayenne); Kner, Panzerwelse, 77, 1853 (Cujaba, Guaporé); Günther, v, 255, 1864 (Surinam); Peters, MB. Ak. Berl. 471, 1877 (Calabozo); Cope, Proc. Am. Philos. Soc. xvii, 681, 1878 (Marañon, Peru); Eigenm. & Eigenm. l. c. (Vigia; Sao Gonçallo; Cameta; Manaos; Para; Rio Negro; Coary; Villa Bella; Gurupa; Rio Preto; Tajapuru; Porto do Moz; Teffé; Marañon; Ucayale; Obidos).

Loricaria cirrhosa Bloch & Schneider, "Syst. Nat. 125, pl. 34," 1801.

Loricaria setifera Lacépède, Hist. Nat. Poiss. v, 140, 1803 (South America).

Loricaria carinata Castelnau, Anim. Amérique du Sud, 46, pl. xxiii, fig. 3, 1855 (Amazon).

Plecostomus flagellaris Gronow, "Cat. Fish. 158, 1854."

Habitat: Rio Preto; Amazons; Guiana.

Form elongate, little depressed forward, the greatest depth 1½ in the width. Caudal peduncle broad, depressed. Head rather high, its depth about equal to the length of the snout; occipital roof-shaped, with two serrate ridges which widen somewhat and become blunt anteriorly, uniting above the posterior nares; humeral plate with a low ridge which extends upward and is continued on 3 of the lateral plates; occipital margined by 3 nuchal plates; 2 large bicarinate nuchal plates between the occipital and dorsal plates.

Orbit moderate, with a broad shallow notch; the superciliary edge coarsely hispid; orbit without the notch, 2½–3¾ in the snout, 6–7 in the head, 1–1½ in the interorbital. Snout with its margin entirely granular, pointed in young, less so in adult specimens. Mouth small, the lips wholly covered with papillæ and tentacles, the marginal ones largest, the lower lip emarginate; teeth few, those of the upper jaw much larger than those of the lower.

Barbels well developed, longer than the diameter of eye, fringed with tentacles.

The lateral line runs close under the upper lateral keel, and is composed of two pores at the posterior margin of each scute.

All the scutes in front of the dorsal carinate; the lateral keels approximated on the 17th or 18th scute. Breast and central portion of the belly backward to the vent covered with small, irregular plates, the sides of the belly with a series of larger plates; in the young the breast is partially naked. Distance of dorsal fin from tip of snout 3–3⅗ in the length, the dorsal fin much higher than long.

Caudal short, emarginate, the upper ray produced, the filament sometimes much longer than the length to its base.

Anal short, high, little lower than the dorsal fin.

Ventrals inserted very slightly behind the dorsal fin, their tips reaching beyond origin of anal fin; pectorals to or little beyond origin of ventral fins.

Purplish to olivaceous; dorsal fin closely covered with chocolate dots; caudal dusky, the tip of the upper lobe light; anal transparent or dusky; upper surface of pectoral and ventral fins closely covered with dark dots and blotches; upper lip and barbels dotted with chocolate.

Head 4–4½; D. 8; A. 6; V. I, 5; P. I, 6; Lat. l. 30–31.

Forty-eight specimens .14–.27 m. long to base of caudal.

Vigia; Sao Gonçallo; Cameta; Manaos; Para; Rio Negro; Villa Bella; Gurupa; Rio Preto; Tajapuru; Porto do Moz; Teffé; Marañon; Ucayale; Obidos; Coary. Thayer Expedition.

327. Loricaria lata.

Loricaria lata Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 36, 1889 (Goyaz).

Types: No. 8123; eleven specimens .11–.27 m. to base of caudal. Goyaz. Senhor Honorio.

Body elongate, everywhere greatly depressed, the depth about 1¾ in the width, the width at origin of anal equals snout and orbit in the adult, equal to the snout alone in the young. Head depressed, its depth considerably less than length of snout, its width little longer than its length to upper angle of gill-opening; posterior half of occipital with two inconspicuous keels. Humeral plate without keels.

A shallow, rounded orbital notch; interorbital very slightly concave. Eye 3¾–4½ in snout, 7–8½ in head, 1⅓–1½ in the interorbital. Snout pointed, its margin entirely granular. Lips margined with cirri, the lower emarginate, its surface also covered with cirri; teeth few, large, those of the upper jaw longer.

Nuchal plates faintly bicarinate; lateral keels rather prominent, approximated on the 20th scute; breast and belly with numerous small plates, almost wholly naked in specimens .10 m. to base of caudal.

Distance of caudal fin from tip of snout 3 in the length. Caudal fin injured. Anal fin as high as the ventrals; outer ventral ray greatly thickened and prolonged, reaching beyond origin of anal fin. Pectorals higher than the ventrals, reaching beyond base of the latter.

Coloration uniform in adult (?); all the fins dusky; young with five dark cross-bars which are most prominent on the sides; fins all more or less spotted; upper lip and barbel dotted.

328. Loricaria macromystax.
Loricaria macromystax Günther, Proc. Zool. Soc. Lond. 1869, 426, fig. 5–6 (Upper Amazon); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 37, 1889.
Habitat: Upper Amazon.

329. Loricaria vetula.
Loricaria vetula Valenciennes, Voy. d'Orbigny, ix, Atlas ii, pl. vi, fig. 2, 1847; Cuv. & Val. xv, 466, 1840 (Buenos Ayres); Günther, v, 256, 1864 (copied); Eigenm. & Eigenm. l. c.
Habitat: Buenos Ayres.

330. Loricaria lamina.
Loricaria lamina Günther, Proc. Zool. Soc. Lond. 1868, 239, figs. 6 and 7 (Xeberos); Eigenm. & Eigenm. l. c.
Habitat: Upper Amazon.

331. Loricaria platystoma.
Loricaria platystoma Günther, Proc. Zool. Soc. Lond. 1868, 236, 237, and 238, fig. 4 and 5 (Surinam); Eigenm. & Eigenm. l. c.
Habitat: Surinam.

LXIV. HARTTIA.

Harttia Steindachner, Süsswasserfische südöstl. Bras. iii, 110, 1876 (*loricariformis*).

Type: *Harttia loricariformis* Steindachner.

Body short, broad, greatly depressed; adipose fin none;

a series of broad paired plates behind the dorsal fin, lateral plates not keeled. Dorsal inserted a little in front of the ventrals.

This genus is composed of a single species which is restricted to Southeastern Brazil.

332. Harttia loricariformis.

Harttia loricariformis Steindachner, Süsswasserfische Südöstl. Bras. iii, 111, fig. 2 a.b. (Rio Parahyba); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 39, 1889 (Rio Parahyba; Itabapuana; Muriahe).

Habitat: Southeastern Brazil.

Form broad, greatly depressed; depth about 2½ in the width which is one orbital diameter less than the length of the head; the least width, immediately in front of the caudal fin, is about equal to one diameter of the eye. Head broad, depressed; occiput flattish, interorbital slightly concave, anterior margin of the snout naked; margin of the head with very fine movable bristles.

Orbit 3½–4 in the snout, 6½–7½ in the head, 1½–1¾ in the interorbital; mouth broad, teeth fine, very numerous, lips rather narrow, thickly papillose. A series of broad plates on the sides of the belly, a pair of rather large anal plates and sometimes a few small plates in front of them; ventral surface otherwise naked; the azygos plate in front of the anal fin is roundish; lateral plates without keels. Two or three plates bordering the occipital.

First dorsal ray thickened and flexible, its outer surface with short bristles; dorsal fin higher than long. Caudal short, slightly emarginate, its outer rays thickened.

Anal fin varying in height, 1–2 in the length of the head. Ventrals reaching at least to origin of anal; pectorals to the second third of the ventrals.

Back marbled; fins spotted.

Head 3⅚–4; D. 8; A. 6; Lat. l. 28.

Twelve specimens, length .11–.23 m. Rio Parahyba; Itabapuana; Muriahe.

LXXV. OXYROPSIS.

Oxyropsis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. ii, 39, 1889 (*wrightiana*).

Type: *Oxyropsis wrightiana* Eigenm. & Eigenm.

This genus differs from *Harttia* as *Hypoptoma* differs from *Otocinclus*. The head is depressed, the eyes marginal, the orbit infringing slighty on the lower surface of the head. Tail depressed. A lateral keel. Belly covered with granular plates. Adipose fin none.

333. Oxyropsis wrightiana.

Oxyropsis wrightiana Eigenm. & Eigenm. l. c. (Lake Hyanuary).

Type: No. 8055; one specimen .037 m. to base of caudal. Lake Hyanuary. L. Agassiz.

Depressed elongate; the depth about 2 in the width. Head depressed, the snout rounded; occipital margined by two nuchal plates; interorbital convex; nares above the anterior margin of the orbit; surface of the head and all the scutes with longitudinal series of small spines; no keels on the head. Lower surface of the head as in *Hypoptoma*. Eye $2\frac{1}{2}$ in the snout, $5\frac{1}{3}$ in head, $2\frac{3}{5}$ in the interorbital. Teeth well developed; lower lip convex, papillose.

Anal groove bounded laterally and posteriorly by a horse-shoe shaped plate, anteriorly by the large shield-shaped anal plate. Belly with three series of plates which are separated anteriorly; thorax with two pairs of large plates. Four series of plates covering the body, the lateral series with a median keel which is strongest above the tip of the anal.

Distance of dorsal fin from tip of snout about $2\frac{3}{5}$ in the length, the first dorsal ray equals the distance between base of pectoral and tip of snout. Caudal fin damaged.

Anal fin as high as the snout and the eye. Ventrals short, not reaching the anal. Pectorals reaching beyond middle of ventrals, little lower than the first dorsal ray, the spine strongly spiny on its outer margin, almost smooth on its inner margin.

Back marbled; sides with numerous minute dark dots; dorsal rays spotted with dark; middle caudal rays blackish; anal and inner surfaces of ventrals and pectorals spotted like the dorsal fin.

D. I, 7; A. 6; V. I, 5; P. I, 5; Lat. l. 26.

SUBFAMILY HYPOPTOPOMINÆ.

LXXVI. HYPOPTOPOMA.

Hypoptopoma Günther, Proc. Zool. Soc. Lond. 1868, 234 *(thoracatum)*.

This genus is distinguished by its low, spatulate snout, and by the armature of the belly. The eyes are on the lateral edge of the head. In the shape of the body it approaches *Pl. granlosus*. The breast is covered by two pairs of granular plates, the dermal ossification of the clavicula and coracoid.

Habitat: Amazon from Rio Negro westward; Venezuela.

ANALYSIS OF THE SPECIES OF HYPOPTOPOMA.

a. Lateral plates not keeled.
  b. Space between the suborbital shield and the clavicle partially naked; lateral plates with spiny ridges; caudal with dark bars. *thoracatum* 334.
  bb. Space between the suborbital shield and the clavicle with an osseus shield; lateral plates smooth; caudal rays brown, margin of the caudal and a vertical line near its base pale; dorsal deep brown at base, dark spots on its middle. *gulare* 335.
aa. Median lateral plates keeled; pectoral spine more strongly serrate on its inner than on its outer margin. *carinatum* 336.

334. Hypoptopoma thoracatum.

Hypoptopoma thoracatum Günther, Proc. Zool. Soc. Lond. 1868, 234, fig. 2 (Xeberos); Peters, MB. Ak. Berl. 1877, 471 (Calabozo); Steindachner, Denk. Ak. Wien, xli, 47, pl. iv, 1879 (Amazon, near Rio Negro; Calabozo); Eigenm. & Eigenm. Proc Cal. Acad. 2d Ser. ii, 40, 1889 (Teffé; Obidos; Manacapuru; Iça; Rio Negro).

Hypoptopoma bilobatum Cope, Proc. Am. Philos. Soc. xi, 1870, 566, fig. (Pebas, Ecuador); id, l. c. xvii, 1878, 679 (Peruvian Amazon); Steindachner, Denk. Ak. Wien, xli, 48, pl. vi, 1879 (Obidos; Lago Alexo; Manacapuru); id. Flusfissche, Südam. iv, 7, 1882 (Rio Huallaga).

Otocinclus joberti Vaillant, Bull. Soc. Philom. 7th Ser. iv, 147, 1880 (Calderon).

Habitat: Solimoens, Marañon and northward.

We are unable to detect any constant differences between *thoracatum* and *bilobatum*. Dr Günther's specimen had a damaged caudal. The figures of *bilobatum* by Cope and by Steindachner do not agree in coloration, ventral covering, etc.

Body subterete, the greatest depth equal to the greatest width. Head greatly depressed forward, its width equal to the length of snout and eye; profile little concave in front, somewhat convex on occiput; interorbital a little convex; occipital ending in a triangular process which is bordered by 3 nuchal plates; prefrontals arrow-shaped. Snout margined by a rhomboidal plate at tip and 4 plates between it and the eye; a series of small plates and sometimes a narrow naked area from the nares forward; marginal plates of the snout with hooklets above and larger ones below.

Eye 3 in snout, 6 in head, 3½–4 in the interorbital.

Two small plates below the 2d marginal plate in front of the eye, a much larger plate below the eye and 4 small plates between the gill-openings. Belly covered with 6–7 pairs of plates, a small median one connects the anterior 2–3 pairs, a large shield-shaped plate between the ventrals.

In a specimen (No. 7760) .05 m. long to base of caudal, there are no plates between the gill-openings, the ventral armature consists of 6 pairs of plates confined to the sides and 5 roundish plates along the middle.

Lateral plates hispid and with a marginal series of spines.

Distance of the dorsal fin from tip of snout little more than 2 in the length; dorsal fin emarginate, its spine as long as the head to the upper angle of gill-opening.

Spine of the adipose fin small, its distance from the dorsal fin almost twice the length of the latter.

Caudal deeply emarginate, its lobes pointed, equal in length to the dorsal spine.

Pectoral spine, in the young, reaching to middle of ventrals, in the old to the origin of the anal, its outer margin with 2 series of spines, largest near the tip.

Ventrals short, not reaching beyond the vent.

Light brown, anterior dorsal rays spotted with darker; caudal fin barred with brown.

Head $2\frac{2}{3}$–$2\frac{4}{5}$; D. I, 7; A. I, 5; V. I, 5; P. I, 6; Lat. l. 22–23.

Six specimens .06–.09 m. Teffé; Obidos; Manacapuru; Iça; ? Rio Negro. Agassiz, James and Dr. Jeffrys.

335. Hypoptopoma gulare.

Hypoptopoma gulare Cope, Proc. Am. Phil. Soc. xvii, 1878, 679 (Marañon; Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 40, 1889.

Habitat: Marañon.

336. Hypoptopoma carinatus.

Hypoptopoma carinatus Steindachner, Denk. Ak. Wien, xli, 49, pl. vi, 1879 (Amazon near Peruvian boundary); E. & E. l. c.

Habitat: Solimoens near Peruvian boundary.

LXXVII. HISONOTUS.

Hisonotus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 40, 1889 *(notatus)*.

Type: *Hisonotus notatus* E. & E.

This genus is distinguished by its large ventral plates, superior eyes, unperforated humeral plate, and absence of an adipose fin.

Habitat: Southeastern Brazil.

337. Hisonotus notatus.

? *Otocinclus maculicauda* Steindachner, in part.

Hisonotus notatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 42, 1889 (Santa Cruz; Juiz de Fora).

Types: No. 7,764. Ninety-five specimens, the largest .04 m. Santa Cruz. Dom Pedro II.

No. 8,177. One specimen, .043 m. Juiz de Fora. Thayer Expedition.

Body somewhat depressed anteriorly, wider than deep. Head narrow and comparatively high; occipital ending in a triangular process which is bordered by a single nuchal plate; profile rather steep and slightly convex; all the plates of the head strongly hispid; a series of rather large recurved spines margining the granular portion of the snout below.

Orbit 3½ in the snout, 7 in the head, 3 in the interorbital.

Outlines of the marginal plate of the snout indistinct.

Ventral surface entirely covered with about 3 series of irregular plates.

Lateral plates strongly hispid, the marginal spines scarcely enlarged.

Distance of dorsal fin from tip of snout little more than 2 in the length; margin of dorsal fin convex. Caudal emarginate.

Pectoral spine not reaching middle of ventrals, its outer margin spiny. Ventral fins reaching little beyond vent.

Light brown; *caudal with a large median blackish blotch* which extends to the margin of the middle caudal rays; outer caudal rays yellow.

Head 3; D. I, 7; A. I, 5; V. I, 5; P. I, 6; Lat. l. 25.

Dr. Steindachner probably includes *minutus* with his *maculicauda*. We here wish to restrict the name *maculicauda* to the species figured by Dr. Steindachner.

LXXVIII. PAROTOCINCLUS.

Parotocinclus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 41, 1889 *(notatus).*

Type: *Otocinclus maculicauda* Steindachner.

This genus is distinguished from *Hisonotus* by possessing an adipose fin.

338. Hisonotus maculicauda.

Otocinclus maculicauda Steindachner, Süsswasserfische südostl. Bras. iv, 6, pl. 1, fig. 2-2b (loc. ?); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 41, 1889 (Santa Cruz).

Habitat: Santa Cruz.

Caudal with a dusky spot on base of middle caudal rays and a smaller one on the tip of its lower rays; eye larger than in *H. notatus;* otherwise as in *Hisonotus notatus.*

Three specimens. Santa Cruz. Dom Pedro II.

LXXIX. OTOCINCLUS.

Otocinclus Cope, Proc. Acad. Nat. Sci. Phila. 1871, 283 *(vestitus).*

Type: *Otocinclus vestitus* Cope.

This genus is distinguished from all other *Loricariidæ* by its perforated temporal plate and large ventral plate. These characters seem to us to be of generic value in themselves, and we exclude from *Otocinclus* all species not possessing them, however closely they may resemble it otherwise.

Habitat: Ambyiacu River; Santa Cruz.

ANALYSIS OF THE SPECIES OF OTOCINCLUS.

a. Lat. l. 23-24. Eye 5 in head. D. I, 7. *affinis* 339.
aa. Lat. l. 21. Eye 3 in head. D. I, 6. *vestitus* 340.

339. Otocinclus affinis.

Otocinclus affinis Steindachner, Süsswasserfische Südostl. Bras. iv, pl. ii, figs. 1-1*b* (Santa Cruz, near Rio Janerio); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 41, 1889 (Santa Cruz).

Habitat: Santa Cruz.

Body heavy, compressed, everywhere deeper than wide. Head angular, profile steep and straight; occipital terminating in an elevated triangular process. Sides of the head vertical, eyes lateral. Interorbital slightly convex; a shallow groove extending from nares forward; all the bones of the head hispid, the spines being strongest on the occipital process.

Orbit 2 in the snout, 5 in the head, 2 in the interorbital.

Snout pointed; lower surface of the head naked except a triangular area below the eye. Surface of clavicle and coracoid hispid, the ventral surface between them and the ventrals closely covered with 3 series of plates; a larger triangular plate between bases of ventral fins; a Y-shaped naked area extending from the vent forward and on either side of the interventral triangular plate.

Tail flattened above and below; all the plates hispid.

Distance of dorsal fin from tip of snout 2–2¼ in the length; dorsal spine high, about one diameter less than length of head.

Caudal emarginate. Pectoral extending little beyond origin of ventrals, the ventrals not to the anal fin.

Light brown; a narrow dusky bar extending from eye to base of caudal.

Head 3; D. I, 7; A. 6; V. 6; P. I, 6; Lat. l. 23–24.

Twenty specimens .03–.045 m. Santa Cruz. Dom Pedro II.

340. Otocinclus vestitus.

Otocinclus vestitus Cope, Proc. Acad. Nat. Sci. Philad. 1871, 283, pl. iv, fig. 2 (Ambyiacu River); Eigenm. & Eigenm. l. c.

Habitat: Ambyiacu River.

SUBFAMILY PLECOSTOMINÆ.

LXXX. MICROLEPIDOGASTER.

Microlepidogaster Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 42, 1889 *(perforatus)*.

Type: *Microlepidogaster perforatus* E. & E.

This genus resembles *Otocinclus* in its perforate temporal plate, and differs from it in the ventral covering and position of the dorsal fin.

341. Microlepidogaster perforatus.

Microlepidogaster perforatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 42, 1889 (Rio Carandahy, Brazil).

Type: No. 8182. One specimen .032 m. to base of caudal; Rio Carandahy, Brazil.

Broad and depressed anteriorly, the depth less than the width. Head broad, depressed, its depth little more than 2 in its length to end of temporal plate; its width 1½ in its length. Snout narrow, pointed, loreal region concave; eye small, 4 in snout, 8½ in head; interorbital concave, equal to the postorbital portion of the head.

Temporal plate perforate, a larger foramen posteriorly directly behind the eye. A large foramen above and behind the pectoral spine.

All the plates hispid, most so on tail, but without keels. Lower surface of the head naked. Teeth well developed in both jaws. Coracoid and clavicula granular. Belly to between the ventrals entirely covered with small granular plates; a rather long, narrow, naked pre-anal region.

Origin of dorsal equidistant from tip of snout and base of caudal; origin of ventrals equidistant from tip of snout and tip of anal fin.

D. I, 7 (?); A. 5 (?); Lat. l. 27.

LXXXI. NEOPLECOSTOMUS.

Neoplecostomus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 170, 171, 1888 (*microps*); id., l. c., ii, 42, 1889.

Type: *Plecostomus microps* Steindachner.

This genus is very closely related to *Plecostomus* from which it differs in the general form, the number of the fin rays, the granulation of the ventral surface and the position of the adipose fin.

ANALYSIS OF THE SPECIES OF NEOPLECOSTOMUS.

a. A. 8	*granosus* 342.
aa. A. 6.	*microps* 343.

342. Neoplecostomus granosus.

Hypostomus granosus Cuv. & Val. Hist. Nat. Poiss. xv, 502, 1840 (Cayenne).
Plecostomus granosus Günther, v, 237, 1864 (copied).
Neoplecostomus granosus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 42, 1889.
Habitat: Cayenne.

This species is known only from the types; as far as we are able to judge, it agrees with *N. microps* in all characters but the number of the anal rays.

343. Neoplecostomus microps.

Plecostomus microps Steindachner. Süsswasserf. Südostl. Bras. iii, 130, pl. xiii (Rio Janeiro); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 170, 171, 1888 (Juiz do Fora, Rio Parahyba; Goyaz).
Habitat: Rio Janeiro; Rio Parahyba; Goyaz.

Head broad, flat, parabolic in front; interorbital region flat; an indistinct ridge from the eye to the nares, no ridges or crests on the postorbital portion of the head. Occipital bone rounded behind, margined by about three nuchal plates; about five plates between the occipital and the dorsal fin. Plates not keeled.

Tail terete.

Sides of the head with rather large plates. Tip of snout naked. Twelve teeth on each side of the upper jaw; 16 teeth on each side in the lower.

Eye 5½ in the snout, 9½ in the head, 3 in the interorbital.

A large subcircular patch of minute granular scutes on the center of the belly; a triangular patch between the gill-opening and the rictus; ventral surface otherwise naked.

Base of the dorsal fin 2 in its distance from the adipose fin; 7 plates between the spine of the adipose and the caudal.

Caudal equal lobed, the shorter ray 2 in the head.

Light brown marbled with darker; tips of the caudal dusky.

Lat. l. 28. A. 6. Head 3½.

One specimen .09 m. Juiz de Fora, Rio Parahyba. Thayer Expedition.

Two specimens .085 m. Goyaz. These two specimens collected by Senhor Honorio have large dusky spots on the rays of all the fins.

LXXXII. Plecostomus.

Plecostomus Gronow, "Mus. i, 24, 1758;" id. Zooph. 127, 1863 (sp).

Plecostomus Bleeker, Nederl. Tijdschr. Dierk. i, 77, 1863 (*brasiliensis* = *plecostomus.*)

Hypostomus Lacépède, Hist. Nat. Poiss. v, 144, 1803 (*guacari* = *plecostomus.*)

Hypostomus Cuv. & Val. xv, 489 (*plecostomus*).

Type: *Plecostomus braziliensis* Bleeker.

Habitat: Cordova and Rio Plata to Guiana region and Rio Magdalena; Amazon to the Ambyiacu; Guayaquil.

In a foot note, page 127 of his Zoophylacium, Gronow says:

"Species subsequentes 391 and 392 huc proprie non pertinent, ut pag 28 monui; ob labia revoluta huic generi eas adjunxi." This leaves in his genus *Plecostomus:* Nos. 393, *Pl. dorso dipterygio: ore dentata; cirris plurimis,* etc., = ? and 394, *Pl. plecostomus.* Bleeker first restricted the name *Plecostomus* as it stands at present.

Hypostomus Lacépède and *Hypostomus* Cuv. & Val. are identical in so far as they have *plecostomus* for their type. *Hypostomus* Lac. is composed of a single species while Cuv. & Val. include in their *Hypostomus* species of several genera.

ANALYSIS OF THE SPECIES OF PLECOSTOMUS.[*][†]

- *a.* Head with three distinct ridges, snout pointed, head usually elevated, occipital plate ending in a pointed occipital crest.
  - *b.* Belly entirely covered with small granular plates.
    - *c.* Posthumeral ridge becoming strongest on the tail which is flat below; outer caudal rays greatly produced; occipital plate margined by several small plates which become coössified with it in the adult. Tip of snout naked or granular. *emarginatus* 344.
    - *cc.* Posthumeral ridge strongest in front, lower surface of the tail similar to its upper surface.
      - *d.* Free margins of the lateral plates covered with long spines; eye $9\frac{2}{3}$ in the head; tip of snout granular; back with a median depression. Lat. l. 32. (Steindachner.) *spinosissimus* 345.
      - *dd.* Margin of the lateral plates with short spines or none.
        - *e.* Tip of snout naked; Lat. l. 28–30; occipital plate margined by a single large nuchal plate except in *carinatus.*
          - *f.* Spots on the caudal as distinct as those on the dorsal.
            - *g.* Lower surface of the head covered with scutes.
              - *h.* Spots all small, as many as 20 on one of the anterior lateral scutes; belly plain. *commersonii* 346.
              - *hh.* Spots rather large, not more than 4 on one of the anterior scutes, forming 4 or 5 longitudinal series on the tail; belly with similar spots. *commersonii affinis* 346*a.*
            - *gg.* Lower surface of the head naked except a triangular spot in front of the gill-openings; spots large as in *affinis;* occipital process shorter than in *commersonii.* *commersonii scabriceps* 346*b.*
          - *ff.* Spots on the caudal less distinct than those on the dorsal; all the scutes with high keels; nuchal plates bicarinate.

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[*] Doubtful species of this genus are *Plecostomus robini* Gill, not of Cuv. & Val.
Hypostomus commersonii Kner, not of Cuv. & Val.
Hypostomus punctatus Kner, not of Cuv. & Val.

[†] No. 352, *Plecostomus virescens* Cope, we have not been able to assign to a place in this key.

i. Lat. l. 28; eye 4½ in the snout, 8 in the head, 3 in the interorbital; outer caudal rays little produced; middle caudal rays $1\frac{1}{5}$–$1\frac{1}{7}$ in the head. Base of the dorsal fin equal to its distance from the caudal, or very little less. *limosus* 347.

ii. Lat. l. 30. Eye 3½ in the snout, 6–6½ in the head; base of the dorsal equal to its distance from the posterior margin of adipose fin. *carinatus* 348.

ee. Tip of snout granular, occasionally naked in *plecostomus*.

j. Lateral plates all more or less strongly keeled; nuchal plates conspicuously bicarinate; shortest caudal rays 1⅓ in the head. Light brown, everywhere spotted with darker. Lat. l. 26. *plecostomus* 349.

jj. Lateral plates scarcely if at all keeled. Lat. l. 27–28.

k. Head with vermiculating light and dark lines; ventral surface with short curved bars; occipital plate margined by three nuchal plates; superciliary edge raised. *vaillanti* 350.

kk. Head with round spots; ventral surface plain; superciliary edge scarcely raised; base of the dorsal less than its distance from the adipose fin. *villarsii* 351.

bb. Belly partially or entirely naked.*

o. Belly covered with minute scutes, except a quadrate space between the ventrals. *biseriatus* 353.

oo. Belly with scutes only on the sides, and sometimes a narrow strip between the ventrals.

p. Lat. l. 27. Upper lateral plates with a strong median keel; head with a strong occipital keel and smaller temporal keels; nuchal plates bicarinate; a band between the pectorals, sides of the belly and a narrow band between the ventrals covered with scutes; dorsal surface, sides and fins spotted with brown; ventral surface plain. *seminudus* 354.

pp. Lat. l. 30; lateral plates not keeled. *annæ* 355.

ooo. Belly entirely naked. *pantherinus* 356.

aa. Head without distinct ridges or keels; snout broad, rounded.

q. Belly entirely covered with granular plates.

r. Tip of snout naked.

s. Dorsal crossed by six or seven black zig-zag stripes; base of the dorsal less than its distance from the adipose; 17 scutes between the anal and the caudal. Lat. l. 30. Brownish black with black dots, largest on belly; rays of the caudal, pectoral and ventral fins crossed by a number of black streaks. *cordovæ* 357.

ss. Dorsal spotted or uniform dusky; base of the dorsal longer than its distance from the adipose fin. Lat. l. 26–27; occipital bordered by a single plate.

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*352 *virescens* Cope, should probably be placed here.

t. Superciliary edge not raised, interorbital highest in the middle, orbit moderate 3 (in specimens .16 m.)–3½ (in specimens .30 m.) in the snout, 5¼–6½ in the head, 2 in the interorbital; postfrontals with a long descending process which forms the entire posterior margin of the eye; dorsal spots as large as or a little smaller than the eye. Lat. l. 26. *lima* 358.

t′. Fins all uniform dark brown. *lima atropinnis* 358*a*.

tt. Superciliary edge greatly raised, interorbital area concave; orbit large, 3 in the snout, 5⅓ in the head, 1¾ in the interorbital; postfrontals without a descending process, forming part of the upper margin of the orbit only; dorsal uniform dusky. Lat. l. 27. *macrops* 359.

rr. Tip of snout granular; eye 6½ in the head; more than 2 in the interorbital; head 3⅓; base of dorsal larger than its distance from the adipose. Olive brown with one or more orange yellow spots on each lateral scute, similar ones on the head, dorsal and caudal. *francisci* 360.

qq. Belly partially or wholly naked; tip of snout naked.

u. Each of the large scutes with two or three small, round yellow spots; eye 2 in the interorbital; thorax nearly entirely covered with granulations, sides of the belly naked; anterior dorsal rays much longer than the head; caudal subtruncate; pectoral spine broad reaching 2nd third of the ventrals, its upper surface with slender curved spines; scutes granular, not keeled; head little more than ¼ of the length. Lat. l. 27. (Günther.) *alatus* 361.

uu. Sides of the body and the fins with irregular longish yellow spots, sometimes confluent into bands; head with round dark spots; head as wide as long; eye 3½ in the snout, 5½ in the head, more than 2 in the interorbital; caudal subtruncate; irregular granular patches on the throat, breast and belly, the granules on the middle of the belly smallest; first dorsal ray equals the length of the head. Lat. l. 27. (Kner.) *auroguttatus* 362.

uuu. Sides of the body usually with round dusky plates; fins with similar spots or plain. Head longer than broad.

v. Occipital bordered by two or three nuchal plates*; base of dorsal almost equal to its distance from the caudal; lateral plates striate not keeled.

w. Caudal plain, spots on the head and on the dorsal not confluent into lines or bars; ventral surface plain, with very few granules; head 3⅓. *lütkeni* 363.

ww. Caudal with wavy crossbars formed by dusky spots on the rays; spots on the head sometimes confluent into vermiculating lines; ventral surface plain, with very few granules. *vermicularis* 364.

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* Not examined in *brevicauda*.

www. Caudal with two series of spots between each two rays. Eye nearly ½ of the interorbital; first dorsal ray longer than the head; caudal obliquely subtruncate; pectoral spine with long, curved spines; head 3½. (Günther). *brevicauda* 365.

vv. Occipital bordered by a single nuchal plate.

x. A single series of large round spots between two dorsal rays, similar spots on the caudal; scutes of the belly reduced to a minimum; snout more regularly convex in transverse profile than in *wuchereri*. Lat. l. 26. *robinii* 366.

xx. Two series of spots between two dorsal rays, the spots much smaller than the eye; upper caudal lobe little shorter than the lower; space between and behind ventrals naked, or with few granules. Lat. l. 26. *wuchereri* 367.

xxx. Spots on the caudal much smaller than those on the dorsal, which are large and ill-defined; caudal very obliquely truncate, the lower lobe being much the longer; space beeween and behind the ventrals mostly granular. Lat. l. 25. *johnii* 368.

344. Plecostomus emarginatus.

Hypostomus emarginatus Cuvier & Valenciennes, xv, 500, 1840 (Brazil).

Hypostomus emarginatus Kner, Hypostomiden, 260, 1853 (Barra do Rio Negro), not Cuv. & Val.

Plecostomus emarginatus Günther, v, 233, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 167, 1888 (Cudajas; Santarem; Manacapuru; Tonantins; Obidos; Fonteboa; Tabatinga; Hyavary; Sao Paolo; Goyaz).

Hypostomus horridus Kner, Hypostomiden, 259, pl. i, fig. 1, 1853 (Rio Guaporé).

Plecostomus horridus Günther, Cat. Fish. Brit. Mus. v, 232, 1864 (copied); Peters, MB. Ak. Berl. 1877, 471 (Calabozo).

Hypostomus squalinum Schomburgk, Fish. Brit. Guiana, 142, pl. 2, 1841 (Rio Branco, Rio Negro and Rio Essequibo).

Plecostomus scopularius Cope, Proc. Acad. Nat. Sci. Philad. 1871, 55 and 286, pl. 16, figs. 1 and 2 (Ambyiacu).

Plecostomus tenuicauda Steindachner, Fisch-fauna Magd. Stromes, 24, pl. vii, 1878 (Magdalen River); id. Fisch-fauna des Cauca and Flüsse bei Guayaquil, 11, 1879 (Cauca).

Habitat: Amazons and tributaries from Para to Ambyiaca; Guiana region; Rio Magdalena.

H. emarginatus C. & V. was based on a dried specimen .51 m. long. The age and condition of the individual most likely prevented the discovery of the small plates on the side of the occipital process, which therefore appeared emarginate. Dr. Steindachner has identified *horridus* with this species.

On page 286 Prof. Cope states that *scopularius* differs from his *biseriatus* in having the dorsal radii, ii, 12.1. The plate, however, shows the dorsal radii as i, 7.1, and a comparison of Cope's and Kner's plates will convince any one of the identity of the two species.

Dr. Steindachner separates his *tenuicauda* on account of the entire granulation of the snout. We have examined a number of specimens which are undoubtedly identical with *emarginatus* which have the tip of the snout granular, and the type of *emarginatus* will most probably be found to have a granular snout. While this is usually a convenient character in separating species, it is not constant in *emarginatus* and *plecostomus*.

We would include under *emarginatus* all those individuals in which the tail is broad, flat below, margined on the sides by the posthumeral keel, and which have the peculiar arrangement of plates already described. Of how little value other characters are may be seen from the following comparisons:

Two specimens of *emarginatus*, each .215 m. long, one a ♂ from Fonteboa, the other a ♀ from Hyavary, differ considerably.

MALE SPECIMEN.	FEMALE SPECIMEN.
Occipital ridge or keel prominent.	Occipital keel or ridge almost obsolete.
Nuchal plates bicarinate.	Nuchal plates not bicarinate.
All the lateral plates keeled.	Lateral plates on the abdominal portion without a trace of a keel, some of those on caudal portion slightly keeled.
Tail more slender than in ♀.	
Snout pointed, entirely granular.	Snout more rounded, naked at tip.
Pectoral spine reaching beyond middle of base of ventrals.	Pectoral spine not reaching base of ventrals; all the fins lower than in the ♂. Pectoral spine and outer caudal rays bristly.
Much darker colored than the female.	

Two specimens about .57 m. long from Manacapuru, ♀, ♂, have the tip of the snout granular; the occipital ridge more prominent in the male than in the female; the nuchal plates obtusely bicarinate in both, the lateral plates slightly more carinate in the male; the pectoral spine not reaching the ventrals in either; pectoral spine and outer caudal rays bristly in both, the bristles in the male being about twice as long as in the female.

The male is much lighter colored than the female.

Elongate, slender; head pointed; occipital with a narrow keel. Blunt ridges from the anterior nares to the occiput. Superciliary margin raised; occipital margined with several small nuchal plates, which, with age, become united with the occipital, making its posterior edge appear emarginate.

Humeral ridge becoming strongest on the caudal portion of the body, margining the flat lower surface of the tail; other scutes more weakly or not at all keeled. A conspicuous plate before the anal fin.

Tip of snout naked, rarely granular.

Eye 4–5½ in the snout, 7–9½ in the head, 3–3½ in the interorbital.

Ventral surface, except a small space in front of the ventrals, entirely covered with small scales.

Base of the dorsal fin less than its distance from the adipose fin.

Outer caudal rays greatly produced, comparatively shorter in the adult and with numerous long bristles. Pectoral spines in the adult with similar but much longer bristles than those on the caudal fin.

Straw color or ashy, roundish dark spots on the dorsal surface, smallest on the head, sometimes confluent into vermiculations, especially in the adult; fins all spotted or with irregular cross bars, the markings least distinct on the caudal; ventral surface usually plain.

Head $3\frac{2}{5}$–4. Lat. l. 28–29.

Fifty-four specimens.

Cudajas; Santarem; Manacapuru; Tonantins; Obidos; Fonteboa; Tabatinga; Hyavary; Sao Paola; Goyaz; Teffé; Para; Iça; Tajapuru.

One specimen, No. 7992, .38 m. long, from Gurupa and another specimen, No. 8021, the exact locality of which is not known, differ in having darker, more regular round spots. All the marginal spines of the scutes are greatly exaggerated; the opercle and preopercle with a marginal series of movable but not truly erectile spines.

345. Plecostomus spinosissimus.

Plecostomus spinosissimus Steindachner, Fisch-fauna des Cauca and Flusse bei Guayaquil, 46, pl. v, fig. 1–1a, 1880 (Rivers near Guayaquil).

Habitat: Western slope of Ecuador.

346. Plecostomus commersonii.

Hypostomus commersonii Valenciennes, Voy. d'Orbigny ix, Atlas ii, pl. vii, fig. 2, 1847; Cuv. &. Val. xv, 495, 1840 (Rio San Francisco; La Plata).

Plecostomus commersonii Günther, v, 232, 1864 (Rio Grande); Hensel, Wiegm. Arch. i, 73, 1870 (Porto Alegre; Guahyba); Steindachner, SB. Ak. Wien, lxxiv, 1876; Süsswasserf. südöstl. Bras. iii, 124 (La Plata; Rio San Francisco; Rio Jacuhy and Codea; Rio Parahyba; Rio Quenda near S. Cruz; Rio Grande); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 168, 1888 (Rio de Janeiro; Santa Cruz; Macacos; Itabapuana).

Hypostomus punctatus Cuvier & Valenciennes, xv, 493, 1840 (Rio Janeiro); ? Schomburgk, Fish. Guiana, part i, 144, 1841 (Rio Branco).

Hypostomus subcarinatus Castlenau, Anim. Amér. Sud, 42, pl. xxi, fig. i, 1855 (Rivers of the province of Mines).

Plecostomus spiniger Hensel, Wiegm. Arch. 1870, i, 73 (Rio Cadea).

Habitat: Southeastern Brazil; Rio Plata and its tributaries.

Head pointed; an indistinct keel from the anterior nares to the occiput, a more prominent keel on the occipital bone; the occipital terminating in a triangular process and bordered behind by a single large plate; nuchal plates bicarinate. Upper lateral scutes more or less strongly carinate; humeral keel strong, continued almost to the caudal fin, the keel indistinct on the caudal portion in the young. Tip of the snout naked.

Eye 3½–5¼ in the snout, 6–9½ in the head, 2½–3¼ in the interorbital.

Belly entirely covered with small scales.

Base of the dorsal fin little longer than its distance from the adipose fin; first ray of the dorsal much higher than the last ray, about equal to the length of the head.

Outer caudal rays little produced, the shortest ray about 1⅓ in the head.

Sides, back and all the fins thickly covered with small roundish dark spots; those on the caudal as conspicuous as the spots on the dorsal fin; in one series between every two rays on the caudal, in 2–6 series on the dorsal; ventral surface plain in the adult.

Lat. l. 28–30. Head 3⅓–3½.

Nineteen specimens .11–.37 m. Rio de Janeiro; Santa Cruz; Macacos; Itabapuana; Rio Parahyba.

346a. Plecostomus commersonii affinis.

? *Plecostomus punctatus* Günther, v, 233, 1864 (South America); not *H. punctatus* C. & V.

Plecostomus affinis Steindachner, Süsswasserfische Südostl. Bras. iii, 127 (Rio Mucuri, near Santa Clara; Rio Parahyba; Muriahé; San Antonio, near San Antonio de Ferros).

Plecostomus commersonii affinis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 168, 1888 (Mendez; Santa Clara; Minas Geraes; Rio Doce at Linhares; Mucuri, Janeiro; Parahyba; San Antonio).

Habitat: Southeastern Brazil.

This variety is much more common than *commersonii* from which it differs by the much larger spots. The keels of the head are almost obsolete in some of the specimens.

We have examined over fifty specimens from .13–.26 m. long.

Mendez; Santa Clara; Rio Mucuri; Rio de Janeiro; Rio Doce at Linhares; Rio Parahyba; Minas Geraes; San Antonio River.

346b. Plecostomus commersonii scabriceps.

Plecostomus commersonii scabriceps Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 168, 1888 (Sao Matheos).

Three specimens .30–.35 m. from Sao Matheos.

Large spots, the occipital process shorter than in *commersonii*; the pectoral spine in two specimens with curved bristles near the tip, the lower portion of the head naked except a triangular area immediately in front of the gill-openings.

347. Plecostomus limosus.

Plecostomus limosus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 167 and 168, 1888 (Rio Grande do Sul).

Allied to *Plecostomus plecostomus* Linnæus.

All the scutes with a distinct median keel, the humeral keel being continued back.

Occipital bone margined by a single large nuchal plate; occipital keel more blunt than in *plecostomus*. Tip of snout naked, the snout more rounded than in *plecostomus*. Interorbital 2 in the head to the end of the opercle.

Eye 4½–5 in the snout, 8–9 in the head, 3–3½ in the interorbital.

Outer caudal rays little produced, middle caudal rays much longer than in *plecostomus*, 1⅙–1⅐ in the head.

Base of the dorsal fin equals its distance from the caudal, or a very little less.

Lat. l. 28.

Otherwise similar to *Pl. plecostomus* Linn.

Types No. 7869. Four specimens .25 m. Rio Grande do Sul; from the Emperor's collection.

348. Plecostomus carinatus.

Plecostomus carinatus Steindachner, Flussfische Südamerika's, ii, 108, plate iv, fig. 2, 1881 (Jatuarana; Ueranduba and Lake Saraca).

Habitat: Amazons.

One specimen; Jutahy.

Dr. Steindachner states that the museum at Cambridge has specimens of this species from the localities quoted. We have not been able to find them. The species is evidently closely related to *Pl. plecostomus;* all the specimens of *Pl. plecostomus* examined by us have 26 series of lateral scutes, while this possesses 30.

349. Plecostomus plecostomus.

Acipenser plecostomus Linnæus, ed. x, 238, 1857.

Loricaria plecostomus Linnæus, ed. xii, 508, 1766 (America); Linnæus, ed. xiii, 1363, 1788; Bloch, Ausländ Fische, 8, pl. 374, 1794, "Bloch & Schneider, Syst. Ichthyol. 124, 1801;" Hyrtle, Denk. Ak. Wien, xvi, 18, 1859 (vertebræ 1 + 20).

Hypostomus plecostomus Cuv. & Val. Hist. Nat. Poiss. xv, 489, 1840 (Maracaibo); Schomburgk, Fish. Guiana, part i, 139, 1841 (Rio Branco); Kner, Hypostomiden, 263 (Ypanema; Matogrosso; Barra do Rio Negro; Surinam).

Plecostomus plecostomus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 168, 169, 1888 (Silva, Lake Saraca; Para; Hyavary; Coary; Rio Puty).

Hypostomus guacari Lacépède, v, 145, 1803 (America).

Loricaria flava Shaw, "Zool. v, 38, pl. 101, 1805."

Plecostomus flavus Vaillant, Bull. Soc. Philom. series 7, iv, 155, 1880 (Calderon).

Hypostomus verres Cuv. & Val. Hist. Nat. Poiss. xv, 365, 1840.

Plecostomus bicirrhosus Gronow, "Cat. Fish. 158, 1854;" Günther, Cat. Fish. Brit. Mus. v, 231, 1864 (Guianas; Cayenne; Para); Kner & Steindachner, Abhandl. Bayr. Akad. Wiss. x, 1, 60, 1865; Hensel, Wiegm. Arch. 1870, i, 75 (Rio Cadeo); Steindachder, Flussfische Südam. ii, 109, 1881.

Plecostomus brasiliensis Bleeker, Silures de Suriname, 7, 1864 (Surinam).

Habitat: Rio Puty; Amazons and northward.

Head pointed, a strong keel on either side from nares to occiput; occipital bone with a strong keel; nuchal plates conspicuously bicarinate. Scutes of upper half of body more or less strongly keeled. Humeral keel strong, extending backward not beyond the 8th scute; the lower two series of scutes without carination. Lower surface of the caudal portion of the body rounded similar to the dorsal surface of the same region. A distinct occipital process, the occipital bordered usually by a single plate behind.

Tip of snout usually granular, sometimes with a triangular naked area.

Eye 3⅓–4¼ in the snout, 6½–8 in the head, 3–3½ in the interorbital.

Belly entirely covered with minute scales.

Base of dorsal fin equal to its distance from the adipose fin, or from the caudal; first rays of the dorsal much higher than the posterior, equal to the length of the head; or not much higher than the last rays.

Outer caudal rays produced; shortest caudal rays 1½ in the head or shorter.

Color very light brown to nearly black, everywhere spotted with darker; the spots smallest on the head; spots on the belly sometimes scarcely larger than those on the head, sometimes 4–6 times as large.

Head 3–3¼. Lat. l. 26.

Twenty-seven specimens. Silva, Lake Saraca; Para; Hyavary; Coary; Rio Puty; Surinam.

350. Plecostomus vaillanti.

Plecostomus vaillanti Steindachner, Süsswasserfische südöstl. Bras. iv, 9, 1877 (Rio Preto): Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 169, 1888 (Rio Puty; Rio Preto; San Gonçallo.)

Habitat: East Central Brazil.

Head rounded in front, superciliary edge greatly raised, a prominent ridge from the nares to the eye, a less prominent one from the eye to the occiput; occipital strongly keeled, terminating in a broad, short, process; margined by three nuchal plates. Upper lateral plates scarcely keeled; humeral keel indistinctly evident on the caudal portion of the body. Tip of the snout granular.

Eye 4–4¾ in the snout, 7–8½ in the head, 2¾–3 in the interorbital.

Belly entirely covered with scales, except around the ventrals.

Base of the dorsal fin longer than its distance from the adipose fin.

Caudal very obliquely emarginate, the shortest rays scarcely more than half as long as the head.

Head with vermiculating light and dark lines, sides of the body with large spots forming about 5 series on the tail; all the fins with large spots; ventral surface with the spots coalescing.

Lat. l. 27–28. Head $2\frac{4}{5}$–3.

Four specimens .15–.25 m. Rio Puty; Rio Preto; San Gonçallo.

Several specimens from Goyaz resemble this species but they are so much damaged as to make it impossible to certainly identify them; these examples have the tip of the snout naked.

351. Plecostomus villarsi.

Plecostomus villarsi Lütken, Overs. Dan. Selsk. 211, 1874, (Caracas); Steindachner, Fisch-fauna des Magd. Stromes, 26, pl. vii, 1878 (notes on the type).

Habitat: Caracas.

352. Plecostomus virescens.

Plecostomus virescens Cope, Proc. Acad. Nat. Sci. Philad. 137, 1874 (Upper Amazon); Cope, Proc. Am. Philos. Soc. xvii, 681, 1878 (Peruvian Amazon).

Habitat: Marañon.

We have been unable to assign this species to a place in the key.

Head wide, depressed; body and tail rather elongate; an obtuse occipital and nuchal elevation; post and preorbital angles well marked. A few preopercular spines. Head below naked behind the mouth; teeth numerous, acutely incurved. Posterior lip entire, smooth. Eye 4 in head, 2 in interobital. Base of dorsal equals its distance from the adipose plus one scutum. Pectoral spine reaching a little beyond base of ventral.

Head $4\frac{1}{2}$. D. I, 7. A. 5. (Cope.)

353. Plecostomus biseriatus.
Plecostomus biseriatus Cope, Proc. Acad. Nat. Sci. Philad. 285, pl. 16, 1871 (Amazon).
Habitat: Amazon.

354. Plecostomus seminudus.
Plecostomus seminudus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 169, 1888 (? Brazil).
Habitat: Brazil.

355. Plecostomus annæ.
Plecostomus annæ Steindachner, Flussfische Südamerika's ii, 112, pl. iii, fig. 2, 1881 (Para).
Habitat: Para.

356. Plecostomus pantherinus.
Hypostomus pantherinus Kner, Hypostomiden, 267, 1853 (Rio Guaporé).
Plecostomus pantherinus Günther, Cat. Fish. Brit. Mus. v, 231, 1864 (copied).
Habitat: Rio Guaporé.

357. Plecostomus cordovæ.
Plecostomus cordovæ Günther, Ann. Nat. Hist. (5) vi, 11, 1880 (Cordova).
Habitat: Central portion of the Argentine Republic.

This species is known only from the types in the British Museum.

358. Plecostomus lima.
Plecostomus lima (Reinhardt MS.) Lütken, Overs. Dan. Selsk. 1873, No. 3, 70 (Rio das Velhas); id. Velhas Flodens Fiske 141, 1875 (Rio das Velhas).
Habitat: Rio San Francisco and its tributaries; Rio Grande do Sul.

We have examined 5 specimens of this species .16–.40 m. Rio San Francisco; Rio das Velhas and Rio Grande do Sul.

Body short and heavy, its depth 1⅔ in its width. Head somewhat longer than broad, its upper surface flattish. None of the plates keeled; posthumeral ridge prominent on the anterior 5 scutes. Tail stout, compressed, flat on upper and lower surfaces. Breast and belly, except a narrow area around the ventrals, covered with large scutes.

Base of the dorsal fin much greater than its distance from the spine of the adipose fin, first dorsal ray considerably higher than the last, equal to or greater than the length of the head.

Head 3½.

358a. Plecostomus lima atropinnis var. nov.

Type: No. 7871a, one specimen .21 m. Goyaz. Senhor Honorio.

359. Plecostomus macrops.

Plecostomus macrops Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. i, 170, 1888 (Rio das Velhas).

This species differs from *lima* only in the characters indicated in the key.

Type: No. 7888, one specimen .28 m. Rio das Velhas. Allen & St. John.

360. Plecostomus francisci.

Plecostomus francisci Lütken, Overs. Dan. Selsk. No. 3, 30, 1873 (St. Francisco River); id. Velhas Flodens Fiske, 143, 1875 (Rio das Velhas).

Habitat: Rio San Francisco and its tributaries.

This species is known to us only from descriptions.

361. Plecostomus alatus.

Hypostmous alatus Castelnau, Anim. Amérique du Sud. 41, plate xx, fig. 1, 1855 (Araguay).

Plecostomus alatus Günther, v, 234, 1864 (River Cipo); Lütken, Velhas Flodens Fiske, 144, 1875 (Rio das Velhas).

Habitat: Araguay; Rio das Velhas.

This species is known to us only from descriptions.

362. Plecostomus auroguttatus.

Hypostomus auroguttatus Kner, Hypostomiden, 269, pl. ii, fig. 3, 1853 (Rio Parahyba).

Plecostomus auroguttatus Günther, v, 234, 1864 (copied); Steindachner, Flussfische Südam. iii, 6, 1881 (Rio Janeiro).

Hypostomus asperatus Castelnau, Anim. Amér. Sud. 41, pl. 20, fig. 2.

Habitat: Coast streams of Southeastern Brazil.

This species is known to us only from descriptions. It seems to differ from all other known species in the width of its head.

363. Plecostomus lütkeni.

Plecostomus lima Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische südöstlichen Brasiliens, iii, 121 (Rio Parahyba; Rio Mucuri; St. Antonio; Rio Quenda; Rio de Pedra) (not Lütken),

Plecostomus lütkeni Steindachner, Süsswasserfische südöstlichen Brasiliens, iv, 1877, 1 (Rio Parahyba; Rio Mucuri; Rio San Antonio; Rio Quenda; Rio de Pedra).

Habitat: Southeastern Brazil.

Body very broad, depressed, the depth $1\frac{2}{3}$ in the width. Head flat above; sides of the snout deeply concave; occipital rounded or obtusely pointed behind; superciliary edge not raised.

Eye $3\frac{1}{2}$–4 in the snout, $5\frac{1}{2}$–7 in the head, 2–$2\frac{1}{5}$ in the interorbital.

Posthumeral keel not continued posterior to the origin of the ventrals.

Lateral plates without a trace of a keel.

Tip of the snout with a broad naked area; a large triangular patch of granules between rictus and gill-opening; usually a narrow strip between the pectoral spines granular, a few granules on sides of belly, the ventral surface otherwise naked.

Last dorsal ray little more than half as long as the first.

Upper portion of the head closely covered with brown spots, a few spots on the body; dorsal fin dusky or more often with large dark spots; caudal uniformly plain dusky; ventrals and pectorals spotted with dark; ventral surface plain; upper surface of the body sometimes with obscure light spots.

Head 3–$3\frac{2}{7}$; Lat. l. 26–28.

Twenty-five specimens .12–.30 m. San Antonio River; Campos.

364. Plecostomus vermicularis.

Plecostomus vermicularis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 170, 171, 1888 (Rio Parahyba; Rio Janeiro; Mendez; Macacos; Goyaz).

Habitat: Eastern Brazil.

This species is closely related to *Pl. lütkeni* Steind.

The ventral surface in the adult is almost entirely covered with granules, except a large naked area at base of ventrals; the anus is surrounded with granules. In the young, the belly is almost wholly naked, there being only a few granules in front of the anus, on the sides of the belly and on the throat.

The spots on the head frequently coalesce into vermiculations; all the fins are profusely spotted with dark, the spots on the dorsal, pectoral and ventral fins sometimes coalescing into cross bars, those on the caudal forming regular transverse series. Dorsal surface of the body with obscure markings, ventral surface plain.

Eye 3–4 in the snout, 5½–8 in the head, 2–2¾ in the interorbital. Lat. l. 26–27. Head 3–3$\frac{2}{7}$.

365. Plecostomus brevicauda.

Plecostomus brevicauda **Günther, v, 235, 1864 (Bahia).**

Habitat: Bahia.

This species is known only from the types in the British Museum.

366. Plecostomus robinii.

Hypostomus robinii **Cuv. & Val. Hist. Nat. Poiss. xv, 501, 1840 (Trinidad; La Plata); ?? Gill, Syn. Fish. Trinidad, W. I. 46, 1858 (Trinidad).**

Plecostomus robinii **Günther, v, 236, 1864 (Bahia) [not C. & V.]; Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische Südöstlichen Brasiliens, iii, 118 (Rio Una near Bahia); Jordan, Proc. U. S. Nat. Mus. 1886, 560 (name only); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 170, 171, 1888 (Rio Una).**

Plecostomus unæ **Steindachner, SB. Ak. Wien, 1878, lxxvii, 383.**

Habitat: La Plata to Trinidad.

Head depressed; snout broad, rounded; interorbital slightly convex; no keels on the head. Occipital terminating in a short triangular process, bordered by a single large nuchal plate as in *punctatus*. Scutes not carinate. Humeral keel strong, disappearing between the fourth and sixth plates. Tip of snout naked.

Eye 4½ in the snout, 7½ in the head, 2½ in the interorbital.

Belly mostly naked; sometimes a few minute rough scutes below the pectoral; a triangular patch of similar scutes between the gill-opening and the rictus, which is sometimes reduced to one or two scutes.

Base of the dorsal fin longer than its distance from the adipose fin.

Caudal fin slightly emarginate, the shortest ray being 1⅗ in the head.

Upper surface of the pectoral spine covered with recurved bristles which are strongest and longest near the tip of the spine.

Dorsal surface and sides thickly covered with dark roundish spots, the spots on the head smallest; ventral surface plain. A single series of spots between two dorsal rays.

Lat. l. 26. Head 3⅕–3⅗.

Two specimens .21 m. Rio Una.

367. Plecostomus wuchereri.

Plecostomus wuchereri Günther, v, 335, 1864 (Bahia).
Habitat: Rio Mucuri to Bahia.

This species is very closely related to *Pl. robinii* C. & V.; it differs in the markings of the fins, and the transverse profile of the head is less regularly convex; the ventral surface more granular. Head 3⅕.

Two specimens, .27–.25 m. Rio Pedra.

368. Plecostomus johnii.

Plecostomus johnii Steindachner, SB, Ak. Wien, lxxiv, 1876, Süsswasserfische südöstlichen Brasiliens, iii, 133 (Rio Puty; Rio Preto); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 170, 171, 1888 (Rio Preto; Rio Puty).
Habitat: Rio Preto; Rio Puty.

Head broad, rounded in front, snout not keeled, regularly convex in transverse profile; superciliary edge raised.

Eye 4 in the snout, 6¾ in the head, 2¼ in the interorbital.

Posthumeral keel not extending posterior to the ventral fins. Lateral plates not carinate.

Last dorsal ray 1½ in the first, which is much shorter than the head. Base of the dorsal fin equal to its distance from the caudal fin.

Pectoral fins extending little beyond origin of the ventrals.

Tip of snout with a small naked area.

Region between the ventrals naked, except sometimes a narrow median bar; in front of this the ventral region is usually covered with granular plates, the granules on the sides of the belly largest.

Caudal very obliquely emarginate.

Color markings indistinct in the specimens examined, the spots on the caudal fin sometimes forming vertical bars.

Sixteen specimens, .125–.16 m. Rio Preto; Rio Puty.

Types.

LXXXIII. RHINELEPIS.

Rhinelepis Spix, Gen. et Spec. Pisc. Bras. 4, pl. 2, 1829 (*aspera*).

Type: *Rhinelepis aspera* Spix.

The larger species of this genus resemble the broad, flat-headed species of *Plecostomus* from which they differ in the absence of the adipose fin. *R. carinatus* resembles more the species of *Hisonotus*, *Otocinclus* and *Microlepidogaster*.

Habitat: Parahyba; Rio San Francisco; Rio Carandahy; Amazons from Manacapuru to Huallaga.

ANALYSIS OF THE SPECIES OF RHINELEPIS.

a. Ventral surface mostly naked.
  b. Lateral plates not keeled, head not crested. *parahybæ* 369.
  bb. Lateral plates all keeled; occipital with three crests. *lophophanes* 370.

_aa_. Ventral surface entirely granular.

_c_. Eye 6–6⅕ in the head to end of occipital plate; head arched above; opercle and interopercle with spiny margins; lateral plates keeled, surfaces of all the plates entirely covered with prominent spiniferous ridges; a series of large plates along the lateral surface of the belly. Lat. l. 22–25. _agassizii_ 371.

_cc_. Eye small, 10 or more in the head; head flattish above; lateral plates not keeled. _aspera_ 372.

369. Rhinelepis parahybæ.

Rhinelepis parahybæ Steindachner, Susswasserfische südöstl. Bras. iv, 2, pl. 2 (Parahyba); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 42, 1889 (Rio Parahyba, at Barra do Pirahy).

Habitat: Rio Parahyba.

Elongate, depressed, the depth 1⅗ in the width.

Head broad, depressed; its width equals its length to the upper angle of the gill-openings; occipital slightly raised in the middle, terminating in a triangular process which is bordered by 3 nuchal plates; interorbital concave. Snout broad, depressed, its tip naked.

Orbit 4 in the snout, 7¼–7 in the head, 3–2¾ in the interorbital.

A few granules between the pectoral spines, an elongate patch along sides of belly, a few granules between the posterior margins of the ventrals, others in front of the vent; the ventral surface otherwise naked.

Lateral plates not keeled, thickly covered with minute spines.

Base of the dorsal fin equal to its distance from the first unpaired plate in front of the caudal fin.

Caudal truncate, the outermost rays prolonged.

Pectoral spine reaching base of ventral, the ventral to vent.

Uniform dark bronze brown, lighter below.

Head 3⅓; D. I, 7; A. 6; V. I, 5; P. I, 6; Lat. l. 25–26.

Four specimens .29–.30 m. Rio Parahyba at Barra do Pirahy. Hartt & Copeland. Thayer Expedition.

370. Rhinelepis lophophanes.

Rhinelepis lophophanes Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 42, 1889 (Santa Cruz).

Type: No. 8164; one specimen .018 to base of caudal. Santa Cruz. Dom Pedro II.

Body short and deep, the greatest depth equal to the greatest width. Head short scarcely wider than high, its depth 1¾ in its length. Occipital with three strongly spiniferous ridges, the median one highest, short, terminating suddenly with occipital. The two other crests extending from above the posterior margin of the eye to the margin of the occipital; other crests extending from the orbit back to the edge of the temporal plate. Nasal pits large, margined by spiniferous ridges; two diverging series of spines extending from between the nares to the margin of the snout. Loreal region concave. Lower surface of head naked, the naked portion bordered by a series of strong recurved spines.

Eye small, slightly in front of the middle of the head.

Coracoid and scapula granular; belly with a small granular plate between the posterior margin of the ventrals and a larger plate behind the pectorals, otherwise naked; lateral and dorsal plates with a conspicuous median keel.

Dorsal inserted slightly behind origin of ventrals, considerably nearer tip of snout than base of caudal; origin of ventrals equidistant from gill-opening and origin of anal.

Traces of a dusky lateral band which is continued on the middle caudal rays.

D. I, 7. A. 6. Lat. l. 22.

371. Rhinelepis agassizii.

Rhinelepis agassizii Steindachner, Süsswasserfische Südöstl. Bras. iv, 12, 1877 (Lake Manacapuru); id. Flussfische Südam. iv, 7, 1882 (Rio Huallaga); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 42, 1889.

Habitat: Manacapuru; Rio Huallaga.

One specimen .12 m. to base of caudal. Manacapuru.

372. Rhinelepis aspera.

Rhinelepis aspera Spix, Gen. et Spec. Pisc. Bras. 4, pl. 2, 1829; Cuv. & Val. xv, 483, 1840 (Rio San Francisco); Schomburgk, Fish. Brit. Guiana, part i, 136, 1841; Günther, v, 253, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 42, 1889.

? *Rinelepis strigosa* Cuv. & Val. xv, 480 (Parana); Schomburgk, Fish. Brit. Guiana, part i, 135, 1841.

Habitat: Rio San Francisco; ? Parana; ? Guiana.

LXXXIV. HEMIANCISTRUS.

<*Hypostomus* Cuv. & Val. v, (sp.)

<*Ancistrus* Kner, Hypostomiden (sp.)

>*Hemiancistrus* Bleeker, Tijdschr. Dierk. i, 78, 1863 (*medians*).

>*Pseudacanthicus* Bleeker, l. c. 79 (*serratus*).

<*Chætostomus* Günther, v, 240, 1864.

Type: *Ancistrus medians* Kner.

Habitat: La Plata; Amazon and its tributaries; Guiana region; Pacific slope of Panama.

We include in this genus all species of *Plecostomini* having small teeth, a granular snout, remote dorsal fins and an erectile spiniferous preopercle. All the species of this genus seem to be rare, and our account of them is limited to a mere list.

Dr. Günther unites in his genus *Chætostomus* species which are not as closely related to each other as some are to other genera. Species with long marginal tentacles on the snout certainly deserve to be separated from others having granulations or spines instead of tentacles, even if they do agree in possessing interopercular spines.

373. Hemiancistrus serratus.

Hypostomus serratus Cuv. & Val. xv, 503, 1840 (Surinam).

Pseudacanthicus serratus Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863); id. Silures de Suriname, 13, pl. i, fig. 3, and pl. iii, fig. 1, 1864 (Surinam).

Chætostomus serratus Günther, v, 241, 1864 (loc. ?).

Hemiancistrus serratus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 43, 1889.

Habitat: Surinam.

374. Hemiancistrus histrix.
Rinelepis histrix Cuv. & Val. xv, 486 (not *Acanthicus histrix* Spix).
Loricaria histrix Vandelli, MS.
Chætostomus histrix Capello, Journ. Sci. Math. Phys. e Nat. Lisboa, vol. 2, 64, pl. vii, 1870 (Brazil).
Hemiancistrus histrix Eigenm. & Eigenm. l. c.
Habitat: Brazil.

375. Hemiancistrus spinosus.
Hypostomus spinosus Castelnau, Anim. Amérique du Sud, 45, plate xxii, fig. 3, 1855 (Amazon).
Chætostomus spinosus Günther, v, 241, 1864 (copied); ? Hensel, Wiegm. Arch. 1870, i, 761 (Porto Alegre).
Hemiancistrus spinosus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 43, 1889.
Habitat: Amazon; ? Porto Alegre.

376. Hemiancistrus medians.
? *Ancistrus medians* Kner, Hypostomiden, 256, 1853 (Surinam).
Chætostomus medians Günther, v, 242, 1864 (Surinam).
Hemiancistrus medians Eigenm. & Eigenm. l. c.
Habitat: Surinam.

377. Hemiancistrus pictus.
Chætostomus pictus Kner, Hypostomiden, 277, pl. iv, fig. 2, 1864 (Barra do Rio Negro).
Chætostomus pictus Günther, v, 242, 1864 (copied).
Hemiancistrus pictus Eigenm. & Eigenm. l. c.
Habitat: Barra do Rio Negro.

This is not *Hypostomus pictus* Castelnau, Anim. Am. Sud. 44, pl. xxii, fig. 2, 1855 (Ucayale) which is also a member of this genus but scarcely identifiable.

378. Hemiancistrus brachyurus.
Ancistrus brachyurus Kner, 279, pl. iv, fig. 1, 1853 (Barra do Rio Negro).
Chætostomus brachyurus Günther, v, 243, 1864 (copied).
Hemiancistrus brachyurus Eigenm. & Eigenm. l. c.
Habitat: Barra do Rio Negro.

379. Hemiancistrus itacua.
Hypostomus itacua Velenciennes, Voy. d'Orbigny ix, Atlas ii, plate vii, fig. 1, 1847; Cuv. & Val. Hist. Nat. Poiss, xv, 505, 1840 (La Plata).
Chætostomus itacua Günther, v, 243, 1864 (copied).
Hemiancistrus itacua Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 43, 1889.
Habitat: La Plata.

380. Hemiancistrus scaphirhynchus.

Ancistrus scaphirhynchus Kner, Hypostomiden, 280, pl. iii, fig. 2 (Barra do Rio Negro).

Chætostomus scaphirhynchus Günther, v, 244, 1846 (copied).

Hemiancistrus scaphirhynchus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 43, 1889 (Hyanuary; Coary; Teffé; Hyavary).

Habitat: Solimoens.

Long, slender, depressed, the depth little more than half the width. Head broad, its sides almost vertical at the orbit; margin of the orbit slightly raised, a groove behind the eye; bones of the head regularly grooved; occipital bordered by 3–5 nuchal plates; post-temporal plates forming half of the upper and a portion of the posterior margin of the orbit, the suborbital bone forming the remainder of the posterior margin; frontal plates with a triangular lateral expansion which reaches the orbit.

Margin of the snout with short bristles.

Orbit 4 in the snout, 7 in the head, 3½ in the interorbital.

Preopercle and opercle erectile, the preopercle with a bunch of spines, the longest of which is longer than the orbit; opercle with a marginal series of short, fixed spines.

Lips broad, sparingly papillose; teeth very fine.

Barbel rudimentary.

Ventral surface of body and head naked.

Dorsal scutes striate, not, or scarcely keeled; lateral scutes keeled, the keels becoming strongest above the anal. Posthumeral keel not prominent.

Distance of the dorsal fin from tip of snout 2⅖ in the length. Base of the dorsal fin equals its distance from the posterior margin of the adipose fin. Last dorsal ray little lower than the first.

Caudal fin obliquely truncate, the lower lobe produced.

Upper surface of the pectoral spine thickly covered with fine cardiform bristles, which are longest in the ♂.

Light or dark brown with indistinct lighter spots; fins obscurely banded.

Head $2\frac{4}{5}$–$3\frac{1}{5}$; D. I, 7; A. 6; Lat. l. 25–26.

Eight specimens .14–.24 m. Hyavary; Coary; Teffé; Lake Hyanuary. Agassiz & Bourget.

381. Hemiancistrus fordii.

Hemiancistrus fordii Günther, Proc. Zool. Soc. Lond. 1868, 231, pl. xxi (Surinam); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 43, 1889.
Habitat: Surinam.

382. Hemiancistrus heteracanthus.

Chætostomus heteracanthus Günther, Proc. Zool. Soc. Lond. 1869, 425, fig. 3–4 (Upper Amazon).
Hemiancistrus heteracanthus Eigenm & Eigenm. l. c. 44.
Habitat: Marañon.

383. Hemiancistrus aspidolepis.

Chætostomus aspidolepis Günther, Proc. Zool. Soc. Lond. 1866, 603 (Veragua); Günther, Fish. Cent. Amer. vi, 1866, 393 and 477 (Veragua).
Hemiancistrus aspidolepis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 43, 1889.
Habitat: Pacific slope of Panama.

384. Hemiancistrus mystacinus.

Ancistrus mystacinus Kner, Hypostomiden, 276, 1853 (Caracas).
Chætostomus mystacinus Günther, v, 244, 1864 (copied).
Hemiancistrus mystacinus Eigenm. & Eigenm. l. c.
Habitat: Caracas.

385. Hemiancistrus oligospilus.

Chætostomus oligospilus Günther, v, 244, 1864 (River Capin).
Hemiancistrus oligospilus Eigenm. & Eigenm. l. c.
Habitat: River Capin.

386. Hemiancistrus schomburgkii.

Chætostomus schomburgkii Günther, v, 245, 1864 (British Guiana).
Hemiancistrus schomburgkii Eigenm. & Eigenm. l. c.
Habitat: British Guiana.

387. Hemiancistrus megacephalus.

Chætostomus megacephalus Günther, Proc. Zool. Soc. Lond. 232, 1868 (Surinam?).
Hemiancistrus megacephalus Eigenm. & Eigenm. l. c. 44.
Habitat: ? Surinam.

388. Hemiancistrus guacharote.

Hypostomus guacharote Cuv. & Val. Hist. Nat. Poiss. xv, 508, 1840 (Porto Rico).

? *Ancistrus guacharote* Gill, Syn. Fish. Trinidad, W. I. 1858, 49 (Trinidad).

Chætostomus guacharote Günther, v, 245, 1864 (copied); Jordan, Proc. U. S. Nat. Mus. 560, 1886 (name only).

Hemiancistrus guacharote Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 43, 1889.

Habitat: Porto Rico; Trinidad.

389. Hemiancistrus trinitatis.

Ancistrus guacharote Gill, Syn. Fish. Trinidad, W. I. 49, 1858 (Trinidad).

Chætostomus trinitatis Günther, v, 246, 1864 (copied); Jordan, Proc. U. S. Nat. Mus. 559, 1886 (name only).

Hemiancistrus trinitatis Eigenm. & Eigenm. l. c.

Habitat: Trinidad.

390. Hemiancistrus vittatus.

Chætostomus vittatus Steindachner, Flussfische Südam. ii, 115, pl. ii, fig. 5, 1881 (Amazon).

Hemiancistrus vittatus Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 44, 1889 (Rio Trombetas; Porto do Moz; Tajapuru; Obidos; Avary).

Habitat: Amazon from Tajapuru to Obidos.

Rather short and heavy forward, the depth about 1½ in the width. Head short and high, its width at the opercles one diameter less than its greatest length; surface of the bones finely granular. Profile steep, convex; a low median ridge from tip of snout to the occiput; occipital bone roof-shaped in the young, slightly convex, with a short median keel in the adult; superciliary edge raised, the ridge less distinct in the adult.

Margin of snout granular except at the tip.

Orbit 2½–3⅓ in the snout, 5–6¼ in the head, 2–2⅓ in the interorbital.

Preopercle erectile, with numerous slender spines; opercle fixed.

A granular region between the gill-opening and the mouth. Teeth small, numerous. Barbel large, as long as the orbital diameter.

In a specimen .07 m. long the ventral surface is nearly naked; in one .11 m. long it is entirely covered with granular scutes, which are largest on sides and near the vent.

All the lateral and dorsal scutes minutely granular, not keeled, the posthumeral keel obtuse.

Distance of the dorsal fin from the snout 2⅖–2½ in the length. Base of the dorsal fin little less than its distance from the caudal fin.

Caudal emarginate.

Adult: Ventral surface plain; the head with reticulating light and dark lines; sides of body irregularly marbled with light and dark; dorsal fin with four dark cross-bands; caudal and ventral fins with three cross-bands; pectoral fins with four dark cross-bands.

Young: A dark band along the posterior margin of the head, a similar band between and below the eyes; a dark band between the nares, and three parallel lines extending forward to the edge of the snout; a dark brown spot or bar above the middle of the pectoral; another bar above the ventral; a dark band below the adipose, and another at the end of the caudal peduncle; dorsal, caudal and pectoral fins each with two black bands; anal and ventrals with a single band.

Head 2¾–3; D. I, 7; A. 5; Lat. l. 23–25.

Five specimens, .07–.18 m. Rio Trombetas; Porto do Moz; Tajapuru; Obidos; Avary.

LXXXV. PARANCISTRUS.

<*Hypostomus* Castelnau, Anim. Amér. Sud. (sp.)

=*Parancistrus* Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 79 *(aurantiacus)*.

Type: *Hypostomus aurantiacus* Castelnau.

This genus is very closely related to *Hemiancistrus* from which it differs in its adnate dorsal fin.

Habitat: Amazon and tributaries.

ANALYSIS OF THE SPECIES OF PARANCISTRUS.

a. Head, body and all the fins with numerous white (sky blue in life) spots; orbit 3 in the snout, 5⅓ in the head, 1⅘ in the interorbital. Caudal obliquely truncate. *punctatissimus* 391.

aa. Orange yellow, borders of the fins carmine. *aurantiacus* 392.

aaa. Uniform dusky, dorsal somewhat lighter; caudal obliquely truncate. *nigricans* 393.

391. Parancistrus punctatissimus.

? *Hypostomus niveatus* Castelnau, Anim. Am. du Sud. 43, pl. xxi, fig. 3, 1855 (Araguay; Goyaz).

? *Chætostomus niveatus* Günther, v, 243, 1864 (copied).

Chætostomus punctatissimus Steindachner, Flussfische Südam. ii, 19, pl. iii, figs. 3–3*a*, 1881 (Amazon).

Parancistrus punctatissimus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 44, 1889 (Porto do Moz).

Habitat: Amazon and its tributaries.

H. niveatus is most probably identical with *punctatissimus*, but a positive identification is impossible from Castelnau's plate and description.

Short, depressed anteriorly, becoming compressed on the tail, the depth at origin of dorsal fin 1⅔ in the width, the width of the caudal peduncle 2½ in its depth. Head depressed, its depth nearly 2 in its greatest length; profile not steep, the interorbital little concave; occipital bone ending in a short process, the margins of which are slightly concave, its apex forming an obtuse angle; 3 nuchal plates bordering the occipital. Bones of the head and all the scutes rough with minute bristles or spines, not keeled. Sides of the head and snout granular, a rather broad naked area at the tip of the snout; no tentacles on the snout; a maxillary barbel about as long as the eye.

Teeth slender, bicuspid.

Ventral surface entirely naked, the abdomen villous.

Orbit about 3 in the snout, 5⅓ in the head, 1⅘ in the interorbital.

Preopercle erectile, with slender bristles.

Posthumeral keel obtuse.

Distance of the dorsal fin from end of snout 2½ in the length. Last dorsal ray joined by a membrane to the spine of the adipose fin and to the back.

Caudal fin obliquely truncate, the lower lobe longest.

Anal fin inserted under the membrane which connects the two dorsal fins.

Ventral fins large, reaching entirely beyond the base of the anal.

Pectorals reaching second 4th of the ventral fins.

White dots on the head, body, and the rays of all the fins; ventral surface dusky from brown punctulations.

Head 3; depth 5; D. I, 7; A. 5; Lat. l. 22.

One specimen .15 m. Porto do Moz. Senhor Vinhas.

392. Parancistrus aurantiacus.

Hypostomus aurantiacus Castelnau, Anim. Amérique du Sud. 43, plate xxi, fig. 2, 1855 (Ucayale).

Chætostomus aurantiacus Günther, v, 246, 1864 (copied).

Parancistrus aurantiacus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 44, 1889.

Habitat: Ucayale.

This species is imperfectly known from Castlenau's figure and description.

393. Parancistrus nigricans.

Hypostomus nigricans Castelnau, l. c. 44, pl. xxii, fig. 1, (Amazon).

Chætostomus nigricans Günther, v, 246, 1864 (copied).

Parancistrus nigricans Eigenm. & Eigenm. l. c.

Habitat: Amazon.

This species is known only from the description and plate quoted.

LXXXVI. Cochliodon.

Cochliodon (Heckel, MS.) Kner, Hypostomiden, 265 (*hypostomus*=*cochliodon*).

This genus is as yet known from a single species. It is distinguished from *Panque* by its simple unarmed preopercle and from the remaining genera of *Plecostominæ* by its dentition.

394. Cochliodon cochliodon.

Hypostomus cochliodon Kner, Hypostomiden 265, pl. ii, fig. 1 (Rio Cujaba).
Plecostomus cochliodon Günther, v, 238 (copied).
Cochliodon cochliodon Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 44, 1889.
Cochliodon hypostomus Heckel (MS.).
Loricaria melanoptera Natterer (MS.).
Habitat: Rio Cujaba.

This species is known only from the types about .19 m. long in the Vienna Museum.

Occiput and sides strongly keeled; ventral surface granular. Yellowish brown, head and fins with dark spots. Head little more than 3 in the length. D. I, 7; A. I, 4. (Kner.)

LXXXVII. PANAQUE.

Panaque Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 44, 1889 *(nigrolineatus)*.

Type: *Chætostomus nigrolineatus* Peters.

This genus is characterized by its large teeth and interopercular spines. The type, *P. nigrolineatus*, is called *Panaque* in Venezuela.

Habitat: Cauca; Upper Amazon; Goyaz and Venezuela.

ANALYSIS OF THE SPECIES OF PANAQUE.

a. Ventral surface entirely covered with granular scutes; A. 5; occiput arched; orbit about 4 in the interorbital.
  b. Depth about 3⅗ in the length; base of dorsal equals its distance from the middle caudal rays. Dark brown, everywhere with wavy longitudinal lines of white, the fins colored and striped like the body. *nigrolineatus* 395.
  bb. Depth about 4⅖ in the length; base of dorsal equals its distance from the posterior margin of the adipose. Uniform bluish gray; ventral surface lighter, fins all uniform in color. *cochliodon* 396.
aa. Ventral surface with only a few granulations behind the throat; A. 4; occiput flat; eye 2 in the interorbital; caudal forked, the lower lobe much longer. *dentex* 397.

395. Panaque nigrolineatus.

Chætostomus nigrolineatus Peters, MB. Ak. Berl. 1877, 471 (Calabozo); Steindachner, Flussf. Südam. iii, 7, 1881 (Orinoco, near Ciudad, Bolivar).

Panaque nigrolineatus Eigenm. & Eigenm. l. c. (Goyaz).

Habitat: South Central Brazil; Central Venezuela.

Short and heavy, the depth one-fifth less than the width, which is about 3 in the length. Caudal peduncle comparatively slender, its depth equal to one-third of the greatest depth.

Head large, its width at the opercles about equal to the length of the snout and orbit; profile rather straight from tip of snout to the eye, the occiput strongly arched; a depression above the eyes; a broad blunt ridge from the eye forward; occipital bone truncate behind, margined by a single, large nuchal plate; temporal shield forming the posterior and half the upper margin of the orbit. Snout rather pointed, entirely granular; the extreme tip sometimes naked.

Orbit 5 in the snout, 7½ in the head, 4 in the interorbital. Lower surface of the head granular; lips with short thick papillæ; teeth large, broad-tipped.

Preopercle large, its bristles slender, the longest varying from 1–2 diameters of the orbit in length. Region between eye and gill-opening entirely granular.

Humeral ridge obtuse; the lateral scutes with short marginal spines which are largest and most numerous on the tail and on the uppermost and lowermost series. Ventral surface entirely granular.

Distance of the dorsal fin from tip of snout about 2 in the length. Base of dorsal fin equals its distance from the base of the middle caudal rays.

Caudal obliquely truncate, the central rays 2 in the head. Anal short, placed under the interspace between the dorsal and adipose fins.

Ventrals inserted under the first dorsal ray, reaching beyond base of anal.

Pectoral fins reaching beyond base of ventrals.

Dark brown, everywhere with wavy longitudinal lines of white; the fins all colored and striped like the body.

Head $2\frac{2}{5}$; D. I, 7; A. 5; V. I, 5; Lat. l. 25–26.

Eight specimens .21–.25 m. Goyaz, Brazil. Senhor Honorio.

396. Panaque cochliodon.

Chætostomus cochliodon (*sive gibbosus*) Steindachner, Ichthyol. Beitr. viii, 69 (Cauca); id. Fisch-fauna des Cauca and Flüsse bei Guayaquil, ii, pl. iv, figs. 1–1*a* (Cauca).

Panaque cochliodon Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii. 44, 1889.

Habitat: Cauca.

This species is known only from the descriptions and figures quoted. It seems to be closely related to *nigrolineatus*.

397. Panaque dentex.

Chætostomus dentex Günther, Proc. Zool. Soc. Lond. 1868, 233 (Xeberos).

Panaque dentex Eigenm. & Eigenm. l. c.

This species is known only from the description quoted. It differs decidedly from *nigrolineatus* and *cochliodon* in the shape of its head, covering of the ventral surface, etc.

LXXXVIII. PTERYGOPLICHTHYS.

Pterygoplichthys Gill, Ann. Lyc. Nat. Hist. New York, vi, 408 (*duodecimalis*).

Liposarcus Günther, Cat. Fish. Brit. Mus. v, 238, 1864 (sp).

Type: *Hypostomus duodecimalis* Cuv. & Val.

This genus contains all those species of *Plecostominæ* with a granular snout and ten or more dorsal rays. The interopercle is formed as in *Plecostomus*, but it is sometimes provided with more spines than in that genus.

Habitat: Rio San Francisco to Rio Magdalena.

ANALYSIS OF THE SPECIES OF PTERYGOPLICHTHYS.

a. Interopercle small, with few or no spines.
  b. D. I, 10. *undecimalis* 398.
  bb. D. I, 11; occipital roof-shaped; light brown, everywhere thickly covered with darker dots; membrane of adipose black. Head 2⅕–2⅘. *etentaculatum* 399.
  bbb. D. I, 12–13, rarely I, 11 in *pardalis*.
    c. Occipital with a prominent ridge or knob; base of the dorsal at least equal to its distance from the tip of the snout. Light or very dark brown, everywhere with large and smaller spots of darker. *gibbiceps* 400.
    cc. Occipital with a low median ridge or keel.
      d. Head and body spotted; dorsal fin as high as long; caudal fin long, obliquely rounded, its lowest ray 2 in the length. *punctatus* 401.
      dd. Head with narrow vermiculating lines, body spotted.
        e. Orbit 3–4½ in the snout. *pardalis* 402.
        ee. Orbit 6½ in the snout. (Cope.) *jeanesianus* 403.
      ddd. Uniform, ferruginous gray; D. I, 13. *multiradiatus* 404.
aa. Interopercle large, freely movable, bearing a cluster of numerous setiform spines; dark brown with light spots and bars. *lituratus* 405.

398. Pterygoplichthys undecimalis.

Chætostomus undecimalis Steindachner, Fisch-fauna des Magdalenen Str. 27, pl. viii, 1878 (Magdalen River); Steindachner, Fischfauna des Cauca and Flüsse bei Guayaquil, 13, 1880 (Cauca).

Pterygoplichthys undecimalis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 44, 1889.

Habitat: Rio Magdalena and tributaries.

399. Pterygoplichthys etentaculatum.

Hypostoma etentaculatum Spix, Gen. Spec. Pisc. 7, plate iv, figs. 1 and 2, 1829 (Brazil).

Pterygoplichthys etentaculatum Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 44, 1889 (Rio San Francisco below the falls).

Hypostomus duodecimalis Cuv. & Val. Hist. Nat. Poiss. xv, 498, plate 454, 1840 (Rio San Francisco; Saint Hilaire).

Pterygoplichthys duodecimalis Günther, v, 251, 1864 (Rio San Francisco).

Hypostomus brevitentaculatus Ranzani, "Nov. Comm. Ac. Sc. Inst. Bonon. 1842, 328."

Ancistrus longimanus Kner, Hypostomiden, 283, 1853 (loc. ?).

Habitat: Rio San Francisco.

There can be little doubt about the identity of *etenta-*

culatum and *duodecimalis*, and the name *etentaculatum* should be retained.

Depth a little less than the width. Head broad, high; occipital roof-shaped, interorbital flattish. Snout in the old rather pointed, its tip naked; interopercle erectile, with a few shortish spines at its tip.

Orbit 3–3½ in the snout, 6–6½ in the head, 2¼–2¾ in the interorbital. Temporal keel distinct; posthumeral keel strong; all the lateral scutes with a strong median keel; ventral surface naked in the young, granular in the adult.

Base of the dorsal fin less than its distance from tip of snout, its height 1½ or more times in its base.

Caudal obliquely emarginate, its outer rays thickened and slightly prolonged.

Pectoral reaching beyond base of ventrals; ventrals little, if at all, beyond origin of anal fin.

Light brown, spotted with darker, the belly spotted with lighter; membrane of adipose fin black; outer caudal rays barred, the remainder of the fin dusky; other fins with very large dusky spots, the light background forming reticulating lines.

Head 2⅘–2¾; D. I, 11; A. 27–28.

Four specimens .09–.22 m. Rio San Francisco, below the falls.

400. Pterygoplichthys gibbiceps.

Ancistrus gibbiceps Kner, Hypostomiden, 252, pl. 5, fig. 2, 1853 (Rio Negro).

Pterygoplichthys gibbiceps Günther, v, 252, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 44, 1889 (Coary; Teffé; Porto do Moz; Lago Alexo; Cudajas; Lake Hyanuary; Santarem; Tabatinga; Lago do Maximo; Jutahy; Villa Bella; Silva; Obidos).

Chætostomus gibbiceps Steindachner, Flussfische Südamerika's, ii, 114, pl. iv, fig. 1, 1881 (Obidos; Villa Bella; Coary; Jatuarana; Gurupa; Tabatinga; Jutahy; Silva, Lake Saraca; Lake Hyanuary; Lago Alexo).

Liposarcus altipinnis Günther, v, 239, 1864 (River Cupai) = young.
? *Liposarcus scrophus* Cope, Proc. Acad. Nat. Sci. Philad. 1874, 136 (Nauta); id. Proc. Am. Philos. Soc. xvii, 681, 1878 (Nauta).
Habitat: Amazon; Solimoens and tributaries; from Gurupa to Nauta.

This seems to be the most abundant species of the *Plecostominæ* inhabiting the Amazon.

Heavy forward, the depth 1⅓ in the width, rapidly tapering from the dorsal spine to the slender tail. Profile steep; occipital with an abrupt, high crest; a slight depression between the middle of the interorbital and the edge of the orbit; temporal keels more or less strongly marked. Snout pointed, its tip naked in the young, granular in the adult.

Interopercle freely movable, with a few movable marginal spines.

Orbit large, 3–4⅓ in snout, 6–7¾ in head, 2½–3⅖ in the interorbital.

Ventral surface entirely naked in young, entirely granular in adult examples.

Lateral scutes with a median series of enlarged spines. Posthumeral keel strong anteriorly.

Distance of the dorsal fin from tip of snout equals the base of the fin or shorter by 2 interradial spaces.

Dorsal fin variable in height, its greatest height always much less than its length.

Caudal obliquely emarginate, the outer rays thick, produced.

Pectoral extending beyond base of ventral fins.

Ventral beyond base of anal.

Light or dark brown, everywhere covered with large, darker spots, interspersed with smaller spots of similar color; spots on the belly large and regular; all the fins closely covered with large dark spots, leaving narrow reticulating lines between; the upper caudal ray sometimes yellowish.

Head about 3; D. I, 12–14; A. I, 4; Lat. l. 28–30.

More than seventy-five specimens, .07–.44 m.

Coary; Teffé; Porto do Moz; Lago Alexo; Cudajas; Lake Hyanuary; Santarem; Tabatinga; Lago do Maximo; Jutahy; Villa Bella; Silva, Lake Saraca; Obidos.

401 Pterygoplichthys punctatus.

Ancistrus duodecimalis Kner, Hypostomiden, 281, 1853 (S.Vicente), not C. & V.

Loricaria punctata Natterer, MS. in Kner, l. c.

Pterygophlichthys punctatus Günther, v, 251, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 45, 1889 (Cudajas).

Chætostomus punctatus Steindachner, Flussfische Südam. ii, 13, 1881 (Tabatinga; Cudajas).

Habitat: Venezuela; Solimoens from Cudajas to Tabatinga.

Form of *P. gibbiceps*. Snout broad, rounded; occipital crest long and low not rising above the nuchal keels; temporal crests sharp; keels of the lateral scutes more strongly marked than in *gibbiceps* or *pardalis*. Orbit 3¼–3½ in snout, 7 in head, 3 in interorbital (in *gibbiceps* of same size 3, 6, 2½). Dorsal fin as high as long. Caudal fin long, obliquely rounded, its lowest ray 2 in the length. Brown everywhere, with round black spots much smaller than those in *gibbiceps;* dorsal with about nine series of spots. Head 3; D. I, 12; Lat. l. 28.

One specimen .18 m. Cudajas. Thayer & Bourget.

402. Pterygoplichthys pardalis.

Hypostomus pardalis Castelnau, Anim. Amérique du Sud. 42, plate xx, fig. 3, 1855 (Amazon).

Liposarcus pardalis Günther, v, 239 (copied); Vaillant, Bull. Soc. Philom. series 7, iv, 155, 1880 (Calderon).

Plecostomus (Liposarcus) pardalis Peters, MB. Ak. Berl. 471, 1877 (Calabozo); Steindachner, Flussfische Südamerika's, iv, 6, 1882 (Rio Huallaga).

Plecostomus pardalis Steindachner, Flussfische Südam. ii, 10, 1881 (Para; Santarem).

Pterygoplichthys pardalis Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 45, 1889 (Santarem; Cudajas; Rio Negro; Teffé; Jutahy; Villa Bella; Obidos; Tabatinga).

Liposarcus varius Cope, Proc. Acad. Nat. Sci. Philad. 1871, 284 (Ambyiacu River).

Habitat: Amazons and tributaries and northward.

Form rather slender; the depth under the dorsal spine a little less than the width; the caudal peduncle subterete, scarcely higher than wide. Head depressed, longer than wide, three ridges on the postorbital portion; occipital bone ending in a narrowly truncate process, the margins of the process concave, bordered by 3–4 bicarinate nuchal plates. All the lateral plates strongly carinate, each keel covered with short, backward-directed spines. Tip of snout naked in an example .16 m. long, granular in those .36–.45 m.

Eye 3–4½ in snout, 6½–10 in head, 3–4 in the interorbital.

Preopercle erectile. Thorax and abdomen entirely granulose.

Base of dorsal fin longer than its distance from the caudal, more than twice its distance from the adipose fin.

Distance of dorsal spine from end of snout 2⅔ in the length, the spine 1⅓–1⅕ in the head, the rays little shorter, the tips of the last when depressed reaching the spine of the adipose fin.

" Adipose " fin, a compressed spine which has its anterior margin covered with short spines, and in the adult, its sides also. Outer rays of the caudal not greatly produced.

Anal short, rather high, a little higher than half the length of the head.

Ventrals about 1⅓ in the head.

Pectoral spine reaching little beyond base of ventrals in the young, to the last fourth in the adult.

Body everywhere spotted with brown, the spots rather large but the largest not equal to the diameter of the eye

Head and throat closely covered with vermiculations which are much narrowerer than the spots on the body. Fins with large black spots, those of the dorsal most numerous on its posterior half.

Head 3; D. I, 11–13; A. 5; Lat. l. 28.

Over fifty specimens .13–.47 m. Santarem; Cudajas; Rio Negro; Teffé; Jutahy; Villa Bella; Obidos; Tabatinga; Bahia (very dark).

403. Pterygoplichthys jeanesianus.

Liposarcus jeanesianus Cope, Proc. Acad. Nat. Sci. Phil. 1874, 135 (Nauta); id. Proc. Am. Philos. Soc. xvii, 1878, 681 (Nauta).

Pterygoplichthys jeanesianus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 45, 1889.

Habitat: Nauta.

This species is very closely related to *P. pardalis* from which it differs in the size of the eye.

404. Pterygoplichthys multiradiatus.

Hypostomus multiradiatus Hancock, Zool. Journ. iv, 246, 1828 (Demarara).

Liposarcus multiradiatus Günther, v, 238 (Demarara).

Habitat: Demarara.

This species is known from a single small specimen.

405. Pterygoplichthys lituratus.

Ancistrus lituratus Kner, Hypostomiden, 285, pl. v, fig. 3, 1863 (Rio Guaporé).

Pterygoplichthys lituratus Günther, v, 252, 1864 (copied); Eigenm. & Eigenm. l. c. (Rio Preto; Rio Puty; Sao Gonçalo; Xingu Cascade).

Chætostomus lituratus Steindachner, Flussf. Südam. ii, 15, 1881 (Rio Guaporé; Rio Puty; Santarem).

Habitat: Eastern Brazil; Rio Guaporé; Amazon.

Broad, elongate, the depth 1⅓ in the width. Head broad; occipital with a long blunt keel; snout pointed, entirely granular in the adult, temporal keel strong; interopercle larger, more freely erectile and more copiously provided with recurved spines or bristles than any other species.

Orbit 2¾–4½ in the snout, 5½–8½ in the head, 2½–4 in the interorbital. Superciliary margin and edge of nares greatly raised in the young; interorbital convex in the adult.

Lateral scutes strongly keeled.

Dorsal fin as long as its distance from tip of snout, its height greater than its length in the young, its height scarcely more than half its length in the adult.

Caudal in the adult short, the rays provided with bristles; in the young the caudal is long, the lowermost ray being 2 in the length.

Pectoral spine bristly, reaching past base of ventrals, these reaching past base of anal in the young, the ventrals not reaching the anal in the very old.

Dark brown, everywhere marked with yellow or dirty white, the light color on the head forming irregular bars and spots which are radially arranged on the occiput, sometimes forming two stellate spots between the eyes; each lateral scute on the tail with a short, median bar of light, on the abdominal portion with irregular light spots; ventral surface with vermiculating light bars; fins all dark brown with light spots on the rays.

Head 3; D. I, 12–13; A. I, 4; Lat. l. 29.

Thirteen specimens .15–.41 m. Rio Preto; Rio Puty; Sao Gonçallo; Xingu Cascade. The specimen from Xingu is more uniform black and has the fins more greatly developed.

LXXXIX. PSEUDANCISTRUS.

Hypostomus Cuv. & Val. Hist. Nat. Poiss. xv, 1840 (sp.)

Pseudancistrus Bleeker, Nederl. Tijdschr. Dierk. i, 1863, 77 (*barbatus*).

Plecostomus Günther, Cat. Fish. Brit. Mus. v, 237, 1864 (sp.)

Type: *Hypostomus barbatus* Cuv. & Val.

Habitat: Rio Mucuri; Guiana and Colombia.

This genus is closely allied to *Plecostomus* and to *Liposarcus*, but differs from both in having the head margined with bristles. This not a sexual character in *Ps. wertheimeri*; whether it is or is not in the other species we are unable to say. The lower surface of the tail normal

ANALYSIS OF THE SPECIES OF PSEUDANCISTRUS.

a. Lower side of head, thorax and belly entirely naked.
  b. Color uniform brown. Eye 2 in the interorbital. *barbatus* 406.
  bb. A series of white dots on each interradial membrane of the dorsal; the scutes with similar spots. Eye 2½ in the interorbital. *guttatus* 407.
  bbb. A series of white dots on the dorsal and caudal rays, the membranes immaculate; scutes with similar dots. Eye 1½ in interorbital, *depressus* 408.
  bbbb. Fins yellowish with round black spots. *setosus* 409.
aa. A narrow band across thorax, sides of belly and region behind ventrals covered with granular plates; a large pectoral pore. V. 6. *wertheimeri* 410.

406. Pseudancistrus barbatus.

Hypostomus barbatus Cuv. & Val. xv, 506, 1840 (La Mana); Schomburgk, Fish. Guiana, part i, 147, 1841; Kner, Hypostomiden, 268, pl. ii, fig. 2 (loc. ?).

Plecostomus barbatus Günther, v, 237, 1864 (Surinam).

Pseudancistrus barbatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 45, 1889.

Habitat: Guiana.

407. Pseudancistrus guttatus.

Hypostomus guttatus Cuv. & Val. xv, 508, 1840 (Surinam).

Plecostomus guttatus Günther, v, 237, 1864 (British Guiana).

Pseudancistrus guttatus Bleeker, Silures de Suriname 10, pl. ii, fig. 2 and pl. iii, fig, 3, 1864 (Surinam); Eigenm. & Eigenm. l. c.

Habitat: Guiana.

408. Pseudancistrus depressus.

Chætostomus depressus Günther, Proc. Zool. Soc. Lond. 232, 1868 (? Surinam) Steindachner, Flussfische Südam. ii, 123, pl. v, fig. 1, 1881 (Surinam).

Pseudancistrus depressus Eigenm. & Eigenm. l. c.

Habitat: Surinam.

409. Pseudancistrus setosus.

Chætostomus setosus Boulenger, Ann. & Mag. Nat. Hist. Ser. 5, vol. 19, 349, 1887 (Colombia).

Pseudancistrus setosus Eigenm. & Eigenm. l. c.

Habitat: Colombia.

410. Pseudancistrus wertheimeri.

Plecostomus wertheimeri Steindachner, SB. Ak. Wien, lv, 1867; Ichthyol. Notiz, v, 1, pl. 1, (Mucuri near Santa Clara); Steindachner, SB. Ak. Wien, lxxiv, 1876; Süsswasserfische südöstlichen Brasiliens, iii, 117 (Rio Mucuri near Santa Clara).

Pseudancistrus wertheimeri **Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 45, 1889 (Santa Clara, Rio Mucuri).**

Habitat: Rio Mucuri.

Depth below the dorsal spine 1½ in the width. Head depressed, flattish above. Surface of the frontals, postfrontals and occipital finely granular; of the temporal plates with finely reticulating dentiferous ridges.

Snout broad, rounded, its tip naked. A series of three large plates between the eye and tip of snout, the central one largest; loreal region concave. A large patch of bristles on the sides of the head, opercle and subopercle; the bristles largest and most numerous in the ♂.

Eye 3½–4 in the snout, 6¾–7½ in the head, 2½–3 in the interorbital.

None of the plates of the body carinate. A large granular plate in front of the gill-openings, lower surface of the head otherwise naked. The plates on the sides of the belly are short and wide, in a single series.

Dorsal fin little, if any, higher than long, its base longer than its distance from the adipose fin; not more than one azygous plate before the adipose spine.

Caudal emarginate, the upper ray produced.

Pectoral reaching to the ventral fins.

Ventrals attaining the anal fin.

A rather large pectoral pore.

Dark brown; a median dark stripe or series of spots on the membrane between the dorsal rays; some spots also on the rays of the dorsal fin; basal half of caudal fin spotted; ventral and pectoral with a median stripe between the rays; two or three series of indistinct light spots on the upper part of the body.

Head 3⅖–3⅓; D. I, 7; A. 6; V. I, 5; P. I, 6; Lat. l. 23–24.

Seven specimens .24–.29 m. Santa Clara, Rio Mucuri.

XC. DELTURUS.

Delturus Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. ii, 45, 1889 *(parahybæ)*.

Type: *Delturus parahybæ* Eigenm. & Eigenm.

This genus is most closely allied to *Hemipsilichthys* from which it differs in its long adnate dorsal fin and the greater development of its lateral plates. The tail is flat below, trenchant above; a cross section being △-shaped. The sides of the head with short fine bristles which do not encroach on the preopercle.

Habitat: Rio Parahyba; Rio Mucuri.

ANALYSIS OF THE SPECIES OF DELTURUS.

a. D. I, 9. Fins plain; lat. l. 24; depth of head less than one-half of its width. *angulicauda* 411.

aa. D. I, 10. Fins all spotted; lat. l. 25–27; depth of head less than one half of its width. *parahybæ* 412.

411. Delturus angulicauda.

Plecostomus angulicauda Steindachner, SB. Ak. Wien, lxxiv, 1876, Süsswasserfische Südöstlichen Brasiliens, iii, 114, plate xii, (Rio Mucuri near Santa Clara; ? Rio Parahyba).

Delturus angulicauda Eigenm. & Eigenm. l. c. (Santa Clara, Rio Mucuri).

Habitat: Rio Mucuri and ? Rio Parahyba.

Head and anterior portion of the body depressed, the greatest depth of the body 1⅔ in its width; tail strongly compressed, flat below, trenchant above. None of the plates on the snout enlarged. Occipital bone subtriangular margined by a single nuchal plate; a naked area behind the temporals. Margin of the snout to the interopercle with short fine bristles.

Interorbital flattish or strongly concave, the superciliary edge raised, margined with short bristles. Eye 3½ in the snout, 5¾–5½ in the head, 1¾–1⅔ in the interorbital.

Teeth large, the tips equal lobed.

A few granules behind the gill-openings, ventral surface otherwise naked. Plates on the lower surface of the tail smooth, covered with skin; other plates with denticulate ridges which terminate in rather large marginal spines.

Last dorsal ray joined to the back by a membrane. A series of three trenchant azygous plates between the dorsal and adipose fins.

Caudal obliquely truncate.

Pectoral and ventral spines thick, covered with numerous short bristles; the pectoral reaching little beyond base of ventral; the ventrals to the anal.

Light brown; the fins all plain.

Head 3–3¼; Lat. l. 24; D. I, 9; A. 6; V. I, 5; P. I, 6.

One specimen .27 m. Santa Clara, Rio Mucuri.

412. Delturus parahybæ.

Delturus parahybæ Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 45, 1889 (Parahyba).

All the fins with large, round, blackish spots.

Lat. l. 25–27; D. I, 10.

Types No. 7726, two specimens .28 m. Parahyba. Thayer expedition.

XCI. HEMIPSILICHTHYS.

Xenomystus Lütken, Vid. Medd. 1873, No. 13, 217, pl. iv, *(gobio)*, name preoccupied in Ichthyology 1868.

Hemipsilichthys Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. vol. ii, 46, 1889 *(gobio)*.

Type: *Xenomystus gobio* Lütken.

This genus is closely related to *Pseudancistrus*. There is a naked area behind the dorsal fin, several highly keeled azygous plates in front of the adipose spine. Tail compressed, flat below, the plates covered with skin. Bases of the lateral plates concealed beneath the skin. Dorsal short.

413. Hemipsilichthys gobio.

Xenomystus gobio Lütken, l. c. (loc. ?).

Hemipsilichthys gobio Eigenm. & Eigenm. l. c. (Rio Parahyba).

Habitat: Rio Parahyba.

Body elongate, its depth 1⅓ in its width. Head broad, depressed, snout broadly rounded, its margin naked, its upper surface covered with small plates, sides of the head with a few short bristles; interorbital somewhat flat.

Eye small, 4½ in the snout, 7½ in the head, 1⅘ in the interorbital.

Entire ventral surface, a small area behind temporal plate and a larger space behind the pectorals naked. Plates on the lower surface of the tail smooth, covered with skin; basal portion of the lateral plates covered with skin. A broad naked median strip behind the dorsal fin.

Base of the dorsal fin 1⅔ in its distance from the adipose fin; a series of six small, keeled plates before the adipose spine.

Pectoral and ventral spines thickly covered with bristles.

Upper surface light brown, with obscure darker markings, ventral surface plain; a dusky spot above the ventral, and one above the pectoral; dorsal and ventrals dusky; caudal and pectorals barred.

Head 3½; D. I, 7; A. 6; V. I, 5; P. I, 6; Lat. l. 27–29.

One specimen, .17 m. Parahyba. Thayer Expedition.

XCII. ACANTHICUS.

Acanthicus Spix, Gen. et Spec. Pisc. Bras. 2, pl. 1 *(hystrix)*.

Type: *Acanthicus hystrix* Spix.

This genus is most nearly related to *Hemipsilichthys* but has no adipose fin. In the typical species the region behind the dorsal is covered with rather large plates, the plates in front of the dorsal are small and numerous and, like those of the sides, are isolate. The entire margin of the snout is beset with bristles.

DOUBTFUL SPECIES OF THIS GENUS.

413.1. *Hypostomus vicinus* Castelnau, Anim. Amérique du Sud, 45, pl. xxiii, fig. 1, 1855 (Ucayale).

The figure represents this species as having a granular snout, a bundle of spines on the interopercle; no adipose fin, dorsal adnate. If these characters are reliable *vicinus* is not an *Acanthicus* but a member of some unnamed genus.

ANALYSIS OF THE SPECIES OF ACANTHICUS.

a. Entire head margined with spines; pectoral spine long and covered with spines; scutes of the body isolate; caudal emarginate. *hystrix* 414.

aa. Marginal spines restricted to the interopercular region; pectoral spine short; scutes all contiguous or overlapping; caudal rounded. *genibarbis* 415.

414. Acanthicus hystrix.

Acanthicus hystrix Spix, Gen. et Spec. Pisc. Bras. 3, pl. 1, 1829 (Amazon); Schomburgk, Fish. Brit. Guiana, part i, 131, pl. i, 1841 (Rio Branco); Günther, v, 253, 1864 (copied); id. Proc. Zool. Soc. Lond. 1868, 233(Xeberos); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 46, 1889 (Para).

Rinelepis acanthicus Cuv. & Val. xv, 487 (copied).

Habitat: Amazons from Para to Xeberos.

This species seems to be very rare, but three specimens being known. It is the roughest of the *Plecostomini* which may partly account for its rarity in museums.

Depth 1⅗ in the width, which is equal to length of head to upper angle of gill-opening. Caudal peduncle slender. Head broad, depressed, flat above, the surface of the plates covered with short, conical spines, arranged in radiating lines on the occipital and temporal plates; margin of snout with numerous short spines.

Orbit small, 8½ in snout, 16 in head, 4½ in the interorbital.

Interopercle with numerous erectile spines, which are flattened and curved at tip like the teeth of the mouth.

Barbels long, reaching nearly to the gill-openings.

Lower surface of head covered with isolate granules; ventral surface entirely granular. Lateral plates isolate, smallest at the base of the dorsal fin; each plate, except on ventral surface of tail, with a median series of strong spines; plates largest on dorsal and ventral surfaces of the tail.

Distance of dorsal spine from end of snout 2⅙ in the length; length of dorsal spine equal to head to upper angle of gill-opening, its anterior surface covered with short, stout spines; the dorsal rays frayed at tip, each portion with a series of hooklets.

Caudal lunate, the outermost rays prolonged, longer than dorsal spine.

Pectoral spine very long and strong, about 2½ in the length, reaching past middle of ventrals, its entire outer surface bearing short, stout spines; ventrals reaching beyond origin of anal.

Brown, spotted with darker; all the fins closely spotted with darker, or almost barred.

Head 2½; D. I, 8; A. I, 5; V. I, 5; P. I, 5; Lat. l. 27.

One specimen, No. 7752, length .71 m. Para. Professor Agassiz.

415. Acanthicus genibarbis.

Rinelepis genibarbis Cuv. & Val. xv, 484, pl. 453 (? Brazil); Schomburgk, Fish. Brit. Guiana, part i, 136, 1841.

Acanthicus genibarbis Günther, v, 253, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 46, 1889.

Habitat: (?)

This species is known only from the types in the Jardin des Plantes.

XCIII. CHÆTOSTOMUS.

<*Hypostomus* Cuv. & Val. xv, 1864.

<*Ancistrus* Kner, Hypostomiden.

>*Chætostomus* Kner. l. c.

=*Chætostomus* Bleeker, Nederl. Tijdschr. Dierkunde, i, 1863, 78 (*loborhynchus*).

<*Chætostomus* Günther, v, 240, 1864.

Type: *Chætostomus loborhynchus* Tschudi.

This genus as here understood includes all naked snouted *Plecostominæ.* We have not been able to examine any species and give here a list with references merely.

Habitat: Eastern slopes, Amazon to Panama; western slopes, Chile to Rio Mamoni. Chiefly in mountain streams.

416. Chætostomus jellskii.

Chætostomus jellskii Steindachner, Ichthyol. Beitr. iv, 53, 1876 (Amable Maria; Monterico); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 46, 1889.

417. Chætostomus latifrons.

Chætostomus latifrons Günther, Proc. Zool. Soc. London, 1869, 426 (Upper Amazons); Eigenm & Eigenm. l. c.

418. Chætostomus macrops.

Chætostomus macrops Lütken, Vid. Medd. 1874, 209 (Surinam); Steindachner, Flussfische Südam. ii, 125, pl. v, fig. 3, 1881; Eigenm. & Eigenm. l. c.

419. Chætostomus stannii.

Chætostomus stannii Kroyer, MS. Lütken, Vid. Medd. 1874, 206 (Puerto Cabello); Steindachner, Flussfische Südam. ii, 120, pl. v, fig. 4, 1881 (Mamoni river, near Chepo); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. 46, 1889.

420. Chætostomus taczanowskii.

Chætostomus taczanowskii Steindachner, Flussfische Südamerika's, iv, 23, plate v, fig. 2–2*a* (Rio de Tortara; Rio de Huambo); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 46, 1889.

421. Chætostomus tectirostris.

Chætostomus tectirostris Cope, Proc. Acad. Nat. Sci. Philad. 1871, 288, pl. 15, fig. 2 (Ambyiacu river); Eigenm. & Eigenm. l. c.

422. Chætostomus variolus.

Chætostomus variolus Cope, (Ambyiacu river); Eigenm. & Eigenm. l. c.

423. Chætostomus nudirostris.
Chætostomus nudirostris Lütken, Vid. Medd. 1874, 207 (Valencia; Venezuela); Steindachner, Flussfische Südam. ii, 120, pl. v, fig. 2, 1881 (notes on types); Eigenm. & Eigenm. l. c.

424. Chætostomus guairensis.
Chætostomus guairensis Steindachner, Flussfische Südam. ii, 121, pl. iii, fig. 1, 1881 (Guaire; Caracas); Eigenm. & Eigenm. l. c.

425. Chætostomus sericeus.
Chætostomus sericeus Cope, Proc. Acad. Nat. Sci. Philad. 1871, 288 (Ambyiacu river); Eigenm. & Eigenm. l. c.

426. Chætostomus malacops.
Chætostomus malacops Cope, l. c. 287, pl. 5, fig. 2 (Ambyiacu river); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 46, 1889.

427. Chætostomus branickii.
Chætostomus branickii Steindachner, Flussfische Südam. ii, 118, pl. vi, fig. 1, 1881 (Callacate, Peru); id. l. c. iv, 23, 1882 (Rio de Huambo); Eigenm. & Eigenm. l. c.

428. Chætostomus fischeri.
Chætostomus fischeri Steindachner, Flussfische Südam. i, 14, pl. iv, fig. 9, 1879 (Mamoni river near Chepo); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser, ii, 46, 1889.

429. Chætostomus loborhynchus.
Chætostomus loborhynchus Tschudi, Fauna Peruana, 26, plate iv, 1845 (Rio Tullumayo); Günther, v, 250, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 46, 1889.

430. Chætostomus dermorhynchus.
Chætostomus dermorhynchus Boulenger, Proc. Zool. Soc. Lond. March, 1887, 277, pl. xxii. (Canelos); Eigenm. & Eigenm. l. c.

431. Chætostomus microps.
Hypostomus erinaceus Günther, Proc. Zool. Soc. Lond. 1859, 420, (Western Ecuador).
Chætostomus microps Günther, v, 250, 1864 (copied); Steindachner, Flussfische Südamerika's, iv, 23, 1882 (Rio de Huambo); Boulenger, Proc. Zool. Soc. Lond. March, 1887, 277 (Canelos); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 46, 1889.

432. Chætostomus nudiceps.
Hypostomus nudiceps Müller & Troschel, Schomb. Reis. Brit. Guiana, iii, 631.
Chætostomus nudiceps Günther, v, 249, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 46, 1889.

433. Chætostomus erinaceus.

Hypostomus erinaceus Cuv. & Val. Hist. Nat. Poiss, xv, 510, 1840 (Chile); Gay, Hist. Chile, ii, 308, 1848 (Chile).

Chætostomus erinaceus Günther, v, 249, 1864 (copied); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 46, 1889.

434. Chætostomus bufonius.

Hypostomus bufonius Cuv. & Val. Hist. Nat. Poiss, xv, 511, 1840 (Rio Apurimac, at an altitude of 2,000 meters).

Chætostomus bufonius Eigenm. & Eigenm. l. c,

435. Chætostomus gymnorhynchus.

Ancistrus gymnorhynchus Kner, Hypostomiden, 275, 1853 (Puerto Cabello).

Chætostomus gymnorhynchus Günther, v, 259, 1864 (copied); Lütken, Vid. Medd. 1873, No. 13, 204 (Puerto Cabello); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 46, 1889.

Hypostomus korsteni Kroyer, MS.

XCIV. ANCISTRUS.

Ancistrus Kner, Hypostomiden 272, 1853 (sp).

Ancistrus Bleeker, Nederl. Tijdschr. Dierk. i, 1863, 77 (*cirrhosus*).

Type: *Hypostomus cirrhosus* Cuv. & Val.

In this genus are included all those species of *Plecostominæ* whose snout is provided with tentacles. The tentacles in some species are constantly present in both sexes even in the very young and the character may be considered of generic value.

Habitat: La Plata to Surinam.

All the species of this genus are very much alike and it would be mostly a mere repetition of words to describe them in full. The following key will give all the essential points.

ANALYSIS OF THE SPECIES OF ANCISTRUS.

a. Margin of the snout naked, provided with tentacles. The females with a narrow naked margin and a single series of simple tentacles or without tentacles in *calamita*; males with a much wider naked area, a series of simple marginal tentacles and a Y-shaped series on the middle of the snout. Thorax and belly naked; scutes of the body not keeled; region between eyes and gill-opening partially naked; opercle erectile; head broad, depressed, without keels.

b. Lower caudal lobe not produced, scarcely, if any, longer than the upper; margin of caudal obliquely truncate, a dusky spot at the base of the first dorsal membrane. D. I, 7; A. 4 or 5; Lat. l. 24.

  c. Eye 6–7½ in the head; preopercular spine 11–15; median tentacles of the male profusely branched, a small granular patch on the breast below the base of the pectoral; faded. *chagresi* 436.

  cc. Eye 7–10 in the head; preopercular spines 25 or more; median tentacles of the male flattened, mostly simple; breast entirely naked; head broad, depressed; dark brown, thickly covered with light spots which are smallest and most regular on the head; ventral surface lighter. Fins dark brown, irregularly spotted with light. *stigmaticus* 437.

bb. Lower caudal lobe decidedly longer than the upper.

  d. Head longer than broad.

    e. Outer caudal rays produced; caudal emarginate.

      f. D. I, 7, rarely I, 8; upper and lower caudal rays produced; 9 to 12 interopercular spines; eye 3–3½ in the interorbital. 6½–7 in the head; median tentacles of the male simple, rarely bifid; lateral scutes with strong marginal spines, a minute granular plate on the breast below the base of the pectoral spine. Dark brown, everywhere covered with rather large light spots; a dark spot on the base of the first dorsal membrane, the remainder usually plain dusky; dorsal otherwise dark brown with wavy, interrupted horizontal bands, other fins spotted with lighter. Head 2¾–3; Lat. l. 24–25. *cirrhosus* 438.

      ff. D. I, 7; dorsal surface dark brown, with two darker cross bands; head irregularly marbled; the color of the body and head much as in *Chætostomus guairensis;* ventral surface and fins colored as in *cirrhosus*, other characters agreeing with those of *cirrhosus*. *cirrhosus dubius* 438*a*.

      fff. D. I, 7; upper and lower caudal rays produced; 9–12 interopercular spines; eye 3–4 in the interorbital, 7 in the head; light or dark brown, everywhere covered with white dots which are largest on the belly; fins colored like the body; a dusky spot on the base of the first dorsal membrane. Head 2⅓–2½. *leucostictus* 439.

    ee. Outer caudal rays not produced.

      g. D. I, 7; dark brown, ventral surface lighter, everywhere with small lighter spots very closely crowded and scarcely evident on the dorsal surface; fins dusky, obscurely marbled; Lat. l. 23; head 3. *hoplogenys* 440.

      gg. D. I, 8–9, rarely I, 7. Dark brown, sometimes everywhere with dark spots which occasionally have a white center; fins dusky, the base of the dorsal obscurely spotted like the body. *temminkii* 441.

dd. Head as broad as long; eye 3½ in interorbital; interopercle with about 14 nonflexible spines; thorax and belly entirely naked; uniform brown. Head 3; D. I. 7; A. 5. (Günther.) *calamita* 442.

436. Ancistrus chagresi.

?*Ancistrus cirrhosus* Kner & Steindachner, Gatt. & Art. v. Fischen aus Central America, 61, 1864 (Rio Chagres).

Chætostomus cirrhosus Günther, Fish. Centr. Am. 478, 1866 (copied).

Ancistrus chagresi Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 47, 1889 (Rio Chagres).

Types: No. 8026; two specimens, ♀ ♂ .14–.19 m. Rio Chagres; Dr. Maak.

These specimens are most likely faded. They are light brown, the caudal and lower fins presenting traces of darker markings.

437. Ancistrus stigmaticus.

Ancistrus stigmaticus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 48, 1889 (Sao Matheos; Goyaz).

Types: No. 8022; one specimen, ♂ .11 m. Sao Matheos; Hartt & Copeland.

No. ? one specimen, ♂ .19 m. Goyaz; Senhor Honorio.

This species has a broad, depressed head, and small eye.

438. Ancistrus cirrhosus.

Hypostomus cirrhosus Valenciennes, Voy. d'Orbigny, ix, atlas ii, plate vii, fig. 3, 1847; Cuv. & Val. Hist. Nat. Poiss. xv, 511, 1840 (Rio Janeiro; Buenos Ayres).

Ancistrus cirrhosus Kner, Hypostomiden, 272, 1853 (Rio Guaporé); Eigenm. & Eigenm. l. c. (Cudajas; Obidos).

Chætostomus cirrhosus Günther, v, 247, 1864 (Essequibo; British Guiana); Hensel, Wiegm. Arch. 1870, i, 76 (stony mountain streams); Vaillant, Bull. Soc. Philom. series 7, iv, 155, 1880 (Calderon); Steindachner, Flussfische Südamerika's, iv, 7, 1883 (Rio Huallaga); Boulenger, Proc. Zool. Soc. Lond. March, 1887, 277 (Canelos).

Habitat: Rio Plata to Guiana.

Seven specimens, .07–.18 m. Cudajas; Obidos.

438a. Ancistrus cirrhosus dubius.

Ancistrus cirrhosus dubius Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 48, 1889 (Gurupa; Tabatinga).

Types: No. 7993, one specimen, ♀, .13 m. Gurupa. Prof. Agassiz.
No. 7984, five specimens, ♂, ♀, .07–.13 m. Tabatinga. Bourget.
No. 7983, five specimens, ♀, .06–.10 m. Tabatinga. Bourget.

This variety differs from *cirrhosus* in the characters mentioned in the key.

439. Ancistrus leucostictus.

Chætostomus leucostictus Günther, v, 248, 1864 (Essequibo); Steindachner, Flussfische Südamerika's, iv, 7, 1882 (Rio Huallaga).

Ancistrus leucostictus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 48, 1889 (Coary; Tabatinga; Jutahy).

Chætostomus alga Cope, Proc. Acad. Nat. Sci. Philad. 1871, 287, pl. 15, fig. 3 (Ambyiacu River).

Habitat: Coary to the Huallaga.

Short, depressed; the depth about $1\frac{2}{5}$ in the width. Head broad flattish; the surface of its shields granular; the temporal shields more coarsely granular, striate. Occipital plate margined by three nuchal plates behind. Postfrontal plate forming the postero-superior two-fifths of the orbit, a suborbital forming postero-inferior fifth; the temporal plate entirely separate from the orbit. Interorbital broad, flattish. Transverse profile of the snout convex. Snout, in the male, broadly naked with numerous simple and few bifid or trifid tentacles; in the female, narrowly naked with a marginal series of simple tentacles.

Orbit 3–$4\frac{1}{2}$ in the snout, $5\frac{1}{2}$–$7\frac{1}{2}$ in the head, 3–4 in the interorbital.

Opercle and preopercle erectile; opercle with a marginal series of fixed spines; preopercle with from 9 to 12 erectile spines, the longest equal to 2 orbital diameters.

Maxillary barbels short; teeth very fine.

Ventral surface naked except a minute granular plate below the pectoral spine.

All the scutes with serrate ridges ending in marginal spines; no keels.

Distance of dorsal from tip of snout $2\frac{1}{5}$ in the length; base of dorsal equals its distance from the caudal.

Caudal obliquely emarginate, the outer rays prolonged, the lower longest.

Pectoral spine reaching beyond base of ventral.

Light or dark brown, everywhere with white dots; a dark spot on the base of the membrane between the dorsal spine and the first ray.

Head 2⅔–2¾; D. I, 7; A. 5; Lat. l. 24.

Thirteen specimens .07–.21 m. Coary; Tabatinga; Jutahy. Thayer expedition.

440. Ancistrus hoplogenys.

Chætostomus hoplogenys Günther, v, 247, 1864 (River Capin, Para).

Ancistrus hoplogenys Eigenm. & Eigenm. Proc. Cal. Acad. 2d. Ser. ii, 48, 1889 (Tajapuru).

Two specimens .06–.13 m. Tajapuru. L. Agassiz.

441. Ancistrus temminkii.

< *Hypostomus temminkii* Cuv. & Val. Hist. Nat. Poiss. xv, 514, 1840 (Cayenne).

Ancistrus temminkii Bleeker, Silures de Suriname, 11, pl. i, fig. 3 and pl. ii, fig 2, 1864 (Surinam); Eigenm. & Eigenm. l. c. (Cudajas; Gurupa; Lake Hyanuary; Teffé; Iça; Rio Trombetas; Jutahy; Serpa; Rio Madeira; Ueranduba; Tabatinga).

Ancistrus dolichopterus Kner, Hypostomiden, 274, pl. iii, fig. 1, 1853 (Barra do Rio Negro).

Chætostomus dolichopterus Günther, v, 249, 1864 (copied); Vaillant, Bull. Soc. Philom. series 7, iv, 155, 1880 (Calderon).

Habitat: Surinam; Amazons from Gurupa westward.

Closely related to *Chætostomus leucostictus* Günther, from which it differs in the following characters:

Median tentacles of the male more numerous and with broader bases. Preopercular spines fewer.

Base of the dorsal equals its distance from the middle caudal rays. Caudal obliquely truncate, the outer rays not produced, the lower lobe longer.

Dark brown with indistinct darker spots; dorsal and caudal uniform dusky, or sometimes with dark spots smaller than those on the body; a dark spot on the base of the membrane between the dorsal spine and the first ray; pectoral and ventral fins dotted with light.

Head 2⅔–3; D. I, 8–9 (7 in one specimen); A. 5; Lat. l. 24.

Over fifty specimens from .06–.20 m. Cudajas; Gurupa; Lake Hyanuary; Teffé; Iça; Jutahy; Serpa; Rio Madeira; Ueranduba; Tabatinga; Rio Trombetas.

No. 8010. Three specimens .04–.047 m. long from Jutahy, and No. 8155, one specimen .037 m. are dark brown with pure white dots which are surrounded with a darker shade of brown or ocellated with black; the pectoral and ventral fins similarly dotted, the dorsal plain dark with minute pure white dots at its base, the caudal plain dark brown except a very narrow white margin; ventral surface lighter brown but also dotted with white. D. I, 8.

442. Ancistrus calamita.

Hypostomus calamita Cuv. & Val. xv, 515, 1840 (Peru, Rio Apurimac).

Chætostomus calamita Günther, v, 248 and 432, 1864 (Apurimac).

Ancistrus calamita Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. ii, 48, 1889.

Habitat: Apurimac River.

FAMILY CALLICHTHYIDÆ.

=*Callichthyoidei* Bleeker, Nederl. Tijdschr. Dierk. i, 82, 1863.

<*Siluridæ proteropodes* Günther, Cat. Fish. Brit. Mus. v, 4, 1864. *Hypostomatinæ* in part.

=*Callichthyidæ* Gill, Arrangement of Families of Fishes, 19, 1872.

Habitat: La Plata to Rio Orinoco; Amazon to Nauta.

We cannot add anything to the description of this family given in the key. It is as distinct from the *Loricariidæ* as it is from the *Siluridæ*. It is probably most nearly related to the *Pygidiidæ*, as the double maxillary barbel of some of the species would hint. The lateral plates are not developed until the fishes have attained a centimeter or more in length, and the young resemble very much some forms of the *Pygidiidæ*.

ANALYSIS OF THE GENERA OF CALLICHTHYIDÆ.

a. Body with two series of lateral laminæ which overlap along the median line forming a band-like depression; adipose fin spinous; ventral fins inserted below or anterior to the dorsal fin; gill-membranes confluent with the skin of the isthmus; teeth, if present, villiform.

b. Two pairs of nuchal plates between occiput and dorsal plate; suture between humeral and coracoid processes extending almost horizontally to the posterior margin of the pectoral armature; a large opening between coracoid and clavicle below and in front of the pectoral spine.

c. Coracoid covered with skin.

d. Sides of the head with bristles. SCLEROMYSTAX XCV.

dd. Sides of the head without bristles; no mental barbels; lower jaw with small bands of teeth on the sides; a naked area along dorsal and ventral surfaces; suborbital bones concealed; dorsal spine rudimentary; caudal rounded. CALLICHTHYS XCVI.

cc. Coracoid exposed below; coracoid bone joined to the clavicle its whole length.

e. Two barbels at each rictus, none at the symphysis.

f. Lower lip without barbels; a naked area along ventral surface; caudal rounded or emarginate; dorsal spine low and flat; pectoral spine serrate on inner margin in the young; outer margin and surfaces covered with bristles. HOPLOSTERNUM XCVII.

ff. Lower lip with 4–6 barbels; ventral surface entirely covered; caudal emarginate; dorsal spine high and pointed, subterete; pectoral spine serrate on inner margin, finer teeth on outer margin. DECAPOGON XCVIII.

ee. One barbel at each rictus; a pair of long barbels at the symphysis; coracoid processes entirely covering breast and belly. DIANEMA XCIX.

bb. Occipital with a narrow process extending to dorsal plate.

g. D. I, 10–11; coracoid process exposed below. BROCHIS C.

gg. D. I, 6-8; coracoid process exposed; suture between coracoid and humeral processes extending from the large pectoral pore obliquely downward and backward to the ventral margin of the pectoral armature; dorsal and pectoral spines long, pungent, their outer surfaces smooth. CORYDORAS CI.

XCV. SCLEROMYSTAX.

Scleromystax Günther, Cat. Fish. Brit. Mus. v, 225, 1864 *(barbatus)*.

Sides covered with two series of plates meeting along the middle of the sides. Two series of plates between the occipital and the base of the dorsal spine. Head depressed, margined with bristles in front of the preopercle. Caudal forked.

443. Scleromystax barbatus.

Callichthys barbatus Quoy & Gaimard, "Voy. Uran. Zool. 234;" Cuv. & Val. Hist. Nat. Poiss, xv, 322, 1840 (Rio Janeiro); Günther, Cat. Fish. Brit. Mus. v, 229, 1864 (copied).

Scleromystax barbatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 164, 1888 (name only).

Habitat: Rio Janeiro.

Mouth very small, protractile; maxillary barbels reaching to the middle of the opercle; 5 azygous shields before the adipose fin.

Dorsal and anal with blackish spots. D. I, 6; A. 7; Lat. plates $\frac{25}{24}$. (Quoy & Gaimard.)

XCVI. CALLICHTHYS.

Callichthys Linnæus, Amœn. Acad. i, 317, 1754.

Callichthys Cuv. & Val. Hist. Nat. Poiss. xv, 294, 1840 (*asper=callichthys*).

Callichthys Bleeker, Nederl. Tijdschr. Dierk. i, 82, 1863 (*tamoata=callichthys*).

Cataphractus Bloch, Ausl. Fische, viii, 80, 1794 (preoccupied in Mammals).

Cataphractus Lacépède, Hist. Nat. Poiss. v, 124 (*callichthys*).

Cataphractus Swainson, Fishes, Reptiles, etc., ii, 304, 1839 (*depressus=callichthys*).

Type: *Silurus callichthys* Linnæus.

Habitat: La Plata to Trinidad.

ANALYSIS OF THE SPECIES OF CALLICHTHYS.

a. Lateral plates $\frac{26}{25}$–$\frac{28}{27}$; barbels reaching beyond the gill-opening. *callichthys* 444.

aa. Lateral plates $\frac{26}{27}$; inner barbel reaching to the eye, the outer one shorter; a series of small spines in front of the adipose fin; light brown, with small darker spots. D. 9; A. 7. (Hensel.) *arcifer* 445.

444. Callichthys callichthys.

Callichthys tamoata Linnæus, Mus. Ad. Fred. 1754, 73; Bleeker, Silures de Suriname, 22, 1864 (Surinam).

Silurus callichthys Linnæus, Syst. Nat. ed. x, 307, 1758 (America); ed. xii, 506, 1766; Gmelin, L. Syst. Nat. i, 1361.

Cataphractus callychthis Bloch, Ausl. Fische. viii, 86, pl. 377, fig. 1, 1794 (after a figure by Prince Maurice, much changed in copying); Bloch & Schneider, "Syst. Ichthyol. 107," 1801; Lacépède, Hist. Nat. Poiss. v, 124, 1803 (the two Indies).

Cataphractus callichthys Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 164, 1888 (Rio Janerio; Pernambuco; Juiz de Fora; Bahia; Mendez; Macacos; Porto Seguro; Surinam).

Callichthys asper Quoy & Gaim. Voy. Uran. Zool. 232, 1829; Cuv. & Val. Hist. Nat. Poiss. xv, 302, 1840 (Cayeune; Rio Janerio); Kner, SB. Ak. Wien, xvii, 1855, Ichthyol. Beitr. 107 (Pará Rio; Surinam; Bahia); Castelnau, Anim. Nouv. Rares de l'Amér. du Sud, 38, 1855 (Bahia), name only; Bleeker, Ichthyol. Arch. In. Siluri, 53, 1858; Günther, Cat. Fish. Brit. Mus. v, 226, 1864 (Bahia; Para); Cope, Proc. Am. Philos. Soc. xvii, 681, 1878 (Nauta).

Cataphractus depressus Swainson, Fishes Rept. etc. ii, 304, 1839, based on Bloch, pl. 377.

Callichthys cælatus Cuv. & Val. Hist. Nat. Poiss. xv, 308, 1840 (Rio Janeiro); Günther, l. c., 227, 1840 (copied).

Callichthys læviceps Cuv. & Val. l. c. xv, 309=♂ .

Callichthys loricatus Gronow, "Cat. Fish. 157," 1854.

Callichthys kneri Gill, Syn. Fish. Trinidad, W. I. Ann. Lyc. Nat. Hist. N. Y. vi, 394, 1858 (Trinidad); Günther, l. c. 227, 1864 (copied); Lütken, Vid. Medd. 1873, No. 18, 214–217 (Trinidad); Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Callichthys affinis Günther, l. c. 226, 1864 (Rio Grande).

Callichthys hemiphractus Hensel, Wiegm. Arch. 1868, i, 374 (Costa da Serra)=the young.

Habitat: La Plata to Trinidad.

Callichthys cælatus is said to differ from this species in the number of dorsal rays, there being 6 instead of 7 or 8. The nuchal plates are also said to differ slightly.

Callichthys loricatus we have placed here on the authority of Dr. Günther.

As there are no characters mentioned in the description of *C. kneri* by which that species can be separated from *C. callichthys*, we see no reason why it should be kept distinct.

Callichthys affinis Günther was separated from *C. callichthys* on the number of lateral plates. The usual number is $\frac{28}{27}$, but we have examined specimens from Rio Janeiro with plates $\frac{26}{25\text{-}27}$. As these specimens are intermediate between *callichthys* and *affinis*, we have placed the latter in the synonymy.

Depth below dorsal spine equal to the width; body compressed backward. Head short, depressed, flat above; its width greater than its length; its depth 1¼ in its length; profile steep; fontanel circular; snout and cheeks naked; suborbital bones covered with skin; opercle with a marginal group of short, slender bristles.

Eye very small, about equal to the fontanel, 4 in the snout, 10 in length of head, 7 in the interorbital space.

Inner rictal barbels longer than the upper, reaching the base or beyond the tip of the humeral process. Nares less than, or about 1 orbital diameter apart, the posterior 1 diameter or less from the eye.

Snout narrowly rounded in front.

Mouth terminal, lower lip with a broad free margin and an incision at the symphysis. Intermaxillaries rudimentary, toothless. An elongate patch of brown-tipped teeth on the sides of the lower jaw.

Gill-openings rather wide, extending under the throat.

Lateral plates covering the entire sides of the body, their posterior margins with fine bristles; a narrow naked area along the back, extending forward on the sides of the base of the dorsal fin, and forming a triangular naked area in front of it; a series of deeply pectinate, scale-like plates in front of the adipose fin, not meeting the lateral plates; a naked strip along the sides of the adipose fin.

The lower surface of the coracoid process entirely concealed by skin in the adult.

Rays on the sides of the unpaired fins, and on the lower surface of the paired fins, thickly covered with short bristles.

Distance of the dorsal fin from the snout $2\frac{3}{5}$–$2\frac{4}{5}$ in the length; dorsal fin with a flat spine as high as the orbital diameter, the greatest height of the fin about equal to the length of the base, the 2d, 3d, 4th and 5th rays of about equal height; the adipose fin composed of a short curved spine about as long as the snout, and a thin triangular adnate membrane, its posterior margin truncate, immediately in front of the caudal fin.

Caudal broad, rounded, 4–$4\frac{3}{5}$ in the length.

Anal short, rounded, its margin extending a little beyond base of caudal fin.

Ventrals rounded, inserted below the posterior half of the dorsal.

Vent between or little posterior to the bases of the last ventral rays.

Pectoral spine short and thick, 4–5 in the length; serrate on its inner margin in the yonng; the sides and outer margin thickly covered with bristles.

Color light or dark brown; fins plain or with minute dark dots; two median rows of light round spots on the sides, a minute pore in the middle of each spot; each lateral plate with a narrow black line, parallel with the margin of the plate, extends upward and downward from each of the white spots.

Head $4\frac{1}{3}$–$4\frac{2}{3}$; depth $4\frac{2}{3}$–$5\frac{1}{3}$; D. I, 7–8; A. 6–7; V. 6; P. I, 7; Lat. pl. $\frac{26}{23}$-$\frac{28}{27}$.

Over fifty specimens, .055–.17 m. Pernambuco; Juiz de Fora; Rio Janeiro; Bahia; Mendez; Macacos; Porto Seguro; Surinam.

The young of this species differs decidedly from the adult. The teeth in the lower jaw form a narrow band along the entire lower jaw. The fontanel reaches the occipital and is divided near its middle by a transverse bridge. Barbels reaching beyond the base of the ventrals. Lateral plates low, not nearly covering the entire sides; nuchal plates rudimentary, almost the entire nuchal region naked. This is undoubtedly the form described by Hensel as *hemiphractus*.

445. Callichthys arcifer.

Callichthys arcifer Hensel, Wiegm. Archiv. 1868, i, 373 (Rio de Janeiro.)
Cataphractus arcifer Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 164, 1888 (name only.)
Habitat: Rio Janeiro.

XCVII. HOPLOSTERNUM.

Callichthys Cuv. & Val. Hist. Nat. Poiss. xv, 1840 (sp).
Hoplosternum Gill, Syn. Fish. Trinidad, 35, 1858 (*lævigatum*=*littorale*).
Type: *Callichthys lævigatus* Valenciennes.
Habitat: Rio Plata to Trinidad and Rio Huallaga.

The exposure of the coracoid process would hardly be sufficient to separate this genus from *Cataphractus*, but the structure of the anterior portion of the coracoid bone in *H. littorale* and *C. callichthys* differs also.

ANALYSIS OF THE SPECIES OF HOPLOSTERNUM.

a. A series of azygous plates extending from the adipose fin forward to the dorsal fin; coracoid processes not entirely covering the breast; a rather broad, truncate occipital process; margins of the first pair of nuchal plates parallel with those of the second in the young, rounded in the adult; no barbels on the chin, the inner rictal barbels reaching beyond base of ventrals. *littorale* 446.

aa. A series of azygous plates extending from the adipose fin forward part way to the dorsal fin.

b. Occipital bone pointed in front, entering as a wedge between the frontals to the fontanel; head broad, depressed; azygous plates about 7; caudal truncate or rounded; lower lip very broad; dorsal fin with a strong flat spine. *thoracatum* 447.

bb. Occipital bone truncate in front, not reaching the fontanel; profile steep; azygous plates 5; caudal emarginate. Head depressed, snout broadly rounded; lower lip little reverted, without barbels; inferior barbel extending to near the end of the ventrals; pectoral spine serrate within, with short bristles without. Eye $3\frac{1}{2}$ in the head. Head 3; D. 8; A. I, 6; V. 7; P. I, 8. Lat. pl. $\frac{23}{24}$. (Cope.)

melampterum 448.

446. Hoplosternum littorale.

Callichthys littoralis Hancock, Zoological Journal, iv, 244, 1828 (Demarara); Günther, Cat. Fish. Brit. Mus. v, 227 (Demarara, British Guiana; Trinidad); Lütken, Vidensk. Medd. 1874. 215 (Trinidad); Vaillant, Bull. Soc. Philom. series 7, iv, 155, 1880 (Calderon); Steindachner, Flussfische Südamerika's, iv, 6, 1882 (Rio Huallaga); Jordan, Proc. U. S. Nat. Mus. 559, 1886 (name only).

Hoplosternum littorale Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. vol. i, 164, 1888 (Surinam; Gurupa; Para; Santarem; Tabatinga; Arary; Silva, L. Saraca; Villa Bella; Porto do Moz; L. Hyanuary; Ueranduba).

Callichthys subulatus Cuv. & Val. Hist. Nat. Poiss. xv, 311, 1840 (Cayenne; Buenos Ayres).

Callichthys lævigatus Valenciennes, Voy d'Orbigny, ix, atlas ii, plate v, fig. 2, 1847; Cuv. & Val. l. c., 314, 1840 (Buenos Ayres; Trinité); Kner, SB. Ak. Wien, xvii, 1855, Ichthyol. Beitr. 109 (no locality).

Hoplosternum lævigatum Gill, Ann. Lyc. Nat. Hist. New York, 1858, vi, 396 (Trinidad); Bleeker, Silures de Suriname, 24, 1864 (Surinam).

Callichthys albidus Cuv. & Val. l. c. 316 (Cayenne).

Hoplosternum stevardii Gill, l. c. 401 (Trinidad).

Habitat: Rio Plata to Trinidad and Rio Huallaga.

Depth everywhere greater than the width. Head longer than broad, about as long as broad in the very old; its depth $1\frac{1}{3}$–$1\frac{1}{6}$ in its length; profile evenly convex, transverse profile arched; fontanel oval or pear-shaped with a bridge across its center, the posterior opening becoming nearly obsolete in the adult. Suborbital bones and opercle exposed, the former wider than the orbit in the adult.

Eye circular, equidistant between end of snout and margin of opercle, $3\frac{1}{3}$ in the snout, 8 in the head, 5 in the interorbital.

Inner barbel longer, extending about to the tip of the pectoral spine, shorter in the very old. Snout depressed, somewhat pointed; intermaxillaries rudimentary; patches of minute teeth in the jaws. Lower lip with a broad free margin which is angularly incised at the symphysis.

Gill-openings continued downward to the middle of the external coracoid, the isthmus measuring 2–3 orbital diameters.

Sides entirely covered with two series of laminæ which are margined with minute bristles; a series of azygous plates behind the dorsal fins divides the lateral laminæ; ventral surface with a rather broad naked area. Coracoid and clavicle joined for their whole length; the coracoid processes diverging posteriorly leave a goblet-shaped naked area between.

Lateral line present, at least anteriorly, consisting of a simple tube extending across the lower portion of the superior series of laminæ, continued forward as pores situated in pits along the sides of the head above the eyes.

Distance of the dorsal spine from the snout 2–2⅓ in the length; dorsal spine short and flat, 2–3 times as high as the eye; second dorsal ray highest, the margin of the fin rounded.

The rays of all the fins roughened with minute bristles. Adipose fin triangular, composed of a curved spine about as high as the dorsal spine and a thin adnate membrane.

Outer rays of the caudal thickened, the fin emarginate, 3–4 in the length.

Anal with a spine similar to that of the dorsal fin, the margin of the fin obliquely truncate, the second ray 2–3 times as high as the last ray, reaching base of caudal fin.

Ventral fins inserted opposite the third dorsal ray, their length 1¼–1½ in the head.

Pectoral spine very variable, 3–6 in the length, its outer surfaces thickly covered with short bristles, its inner margin either smooth or serrate, its tip sharp in the young, bluntish and sometimes claw-like or hooked in the adult. A very long tapering anal papilla.

Olivaceous, two series of light spots along middle of sides; fins dusky, sometimes marbled.

Head $3–3\frac{3}{4}$; depth $3–3\frac{1}{3}$; D. I, 8; A. I, 7; V. 6; Lat. pl. $\frac{24-25}{23}$.

Over sixty specimens .09–.23 m. Surinam; Gurupa; Para; Santarem; Tabatinga; Arary; Silva, Lake Saraca; Villa Bella; Porto do Moz; L. Hyanuary; Ueranduba.

447. Hoplosternum thoracatum.

Callichthys thoracatus Cuv. & Val. Hist. Nat. Poiss, xv, 309, pl. 443, 1840 (Mana; Martinique); Peters, MB. Ak. Berl. 471, 1877 (San Fernando de Apure); Kner, SB. Ak. Wien, xvii, 1855, Ichthyol. Beitr. 108 (Surinam); Günther, Cat. Fish. Brit. Mus. v, 228 (copied); Jordan, Proc. U. S. Nat. Mus. 1886, 559 (name only).

Callichthys (*Hoplosternum*) *thoracatus* Steindachner, Fisch-fauna des Cauca and Flüsse bei Guayaquil, 14, 1880 (Cauca).

Hoplosternum thoracatum Gill. Syn. Fish. Trinidad, 36; Bleeker, Silures de Suriname, 26, 1864 (Surinam); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 164, 1888 (Curupira; Tabatinga; Cudajas; Gurupa; Teffé; L. Hyanuary; Villa Bella; Para; Ueranduba; Porto do Moz; Pernambuco; Obidos).

Callichthys longifilis Cuv. & Val. Hist. Nat. Poiss. xv, 317, 1849 (Cayenne); Schomburgk, Fish. Guiana, part i, 150, drawings No. 22, pp. 151, 154, 1841 (Curassarraka): Günther, Cat. Fish. Brit. Mus. v, 228, 1864 (Surinam; River Cupai).

Hoplosternum longifilis Gill, Syn. Fish. Trinidad, 36 (Trinidad, W. I.); Cope, Proc. Am. Philos. Soc. xvii, 1878, 681 (Nauta); Bleeker, Silures de Suriname, 27, 1864 (Surinam).

Callichthys personatus Ranzani, "Nov. Comm. Acad. Scient. Insti. Bonon. 1842, 322, pl. 24."

? *Callichthys exaratus* Müller & Troschel, Schomb. Brit. Guiana, iii, 630, 1848 (Guiana).

Callichthys pictus Müll. & Trosch. l. c.

Callichthys sulcatus Kner, SB. Ak. Wien, xvii, 1855, Ichthyol. Beitr. 110 (Rio Branco and Marabitanos).

? *Callichthys chiquitos* Castelnau, Anim. Nouv. Rares de l'Amér. du Sud. 38, plate xviii, fig. 2, 1855 (Chiquitos).

Habitat: Amazon and northward.

Callichthys longifilis can scarcely be kept distinct from *thoracatus*. The color is very variable, and otherwise we are not able to separate the two nominal species. In *thoracatus* there is a narrow light bar at the base of the caudal, the broad black band of *longifilis* being more or less indistinct. The breast of *thoracatus* is also unspotted sometimes.

C. pictus is evidently equivalent to *longifilis*. The color of *exaratus* is not stated.

C. sulcatus differs in the number of fin rays. This difference may be caused by the method of counting.

C. chiquitos was based on a figure and a very poor specimen. The barbels are said to be much shorter than in *thoracatus*.

Form rather heavy, the depth below the dorsal spine little exceeding the width, becoming compressed backward, but little lower posteriorly. Width of the head equal to or shorter than its length, its depth 1⅓–1⅕ in its length. Ventral profile horizontal throughout, the dorsal outline of the body scarcely descending backward, the profile, from the dorsal spine forward, steep; apex of the first nuchal plate nearly truncate, the second emarginate. Fontanel elongate in the young, becoming circular in the adult. Suborbital much narrower than the eye in the young, broadening and covered with skin in the adult; opercles hispid.

Barbels very long, the inner ones reaching beyond base of ventrals, shorter in the very young.

Eye small, equidistant between tip of snout and opercular margin, or nearer the former, about 3½ in the snout, 4½–5½ in the interorbital. Snout somewhat pointed, depressed. No teeth in the upper jaw; a small, elongate group on the sides of the lower jaw.

Width of the isthmus between the gill-openings equals the length of the snout.

Lateral laminæ covering the entire sides; about four pairs of them meeting on the back immediately behind the dorsal fin; 7–9 azygous plates in front of the adipose fin. In the young the margin and in the adult the surface of the laminæ also with minute bristles.

Coracoid processes in the ♀ diverging backward; in the ♂ their margins free, sometimes overlapping on the breast and belly. Behind the pectoral fin the coracoid and humeral processes are depressed. Distance of the dorsal spine from the snout $2\frac{1}{5}$–$2\frac{1}{2}$ in the length; the dorsal spine short, broad and flat, hispid in front, about 3 in the head, the fin rounded, about as high as long. The spine of the adipose fin higher than that of the dorsal, not flattened, thickly hispid.

Caudal truncate, $3\frac{1}{3}$–$4\frac{1}{2}$ in the length.

Anal obliquely rounded, much higher than long.

Ventrals 1–$1\frac{1}{2}$ in the head.

Pectoral spine, in the ♀, $5\frac{1}{3}$ in the length, its inner margin finely pectinate, its outer surface setiferous; in the ♂ $2\frac{2}{3}$–$3\frac{3}{4}$ in the length.

Olivaceous, irregularly marked with darker; sometimes everywhere with small round brown spots; sometimes with broad bands across the back and marblings below; ventral surface usually lighter and spotted with dark brown; dorsal fins spotted with brown, usually the margin and anterior rays nearly black; caudal spotted with brown, a broad median and narrower basal and marginal cross bars of dark brown, sometimes irregularly spotted; other fins spotted with brown, sometimes with a median cross band; the old more uniform in color.

Head $3\frac{1}{2}$–4; depth $3\frac{1}{3}$–$4\frac{1}{2}$; D. I, 7–8; A. I, 5–7; V. 6; Lat. pl. $\frac{25}{24}$.

Over one hundred and twenty-five specimens .03–.225 m.

Silva, Lake Saraca; Curupira; Tabatinga; Cudajas; Gurupa; Teffé; Lake Hyanuary; Villa Bella; Para; Ueranduba; Santarem; Porto do Moz; Pernambuco; Obidos.

448. Hoplosternum melampterum.

Callichthys melampterus Cope, Proc. Acad. Nat. Sci. Philad. 1871, 275, pl. xiv, fig. 4 (Ambyiacu River).

Hoplosternum melampterus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 165, 1888 (name only).

Habitat: Ambyiacu River.

XCVIII. DECAPOGON.

Decapogon Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 165, 1888.

Type: *Callichthys adspersus* Steindachner.

449. Decapogon adspersum.

Callichthys adspersus Steindachner, Ichthyol. Beitr. v, 87, pl. xi, figs. 2-2b (Santarem to Tabatinga; Xingu, near Porto do Moz).

Decapogon adspersus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 165, 1888 (Cudajas; Tabatinga; Porto do Moz).

Habitat: Porto do Moz to Tabatinga.

Body deepest at the dorsal spine, its width about 1½ in its depth, tapering backward to the slender, low caudal peduncle. Profile from tip of snout straight and steep to the occiput, thence curved to the dorsal spine; transverse profile of the head everywhere gently arched; apex of the nuchal plates angular. Fontanel ovate or elongate. Suborbital bone narrow, its surface and the opercles hispid.

Inner rictal barbels longest, about reaching extremity of pectoral spine; six short barbels on the lower lip, the innermost pair very minute.

Eye strictly lateral, nearer opercular margin than to the end of the snout, 2–2½ in snout, 4½–5 in head, 3–4 in the interorbital, measured above or below. Snout acute, depressed. No teeth in the upper jaw; an elongate patch on the sides of the lower jaw. Width of the isthmus equal to the length of the postorbital part of the head.

Sides wholly covered by the scutes which overlap on the back behind the dorsal fin, four or five azygous plates in front of the adipose dorsal, the lateral scutes meeting or barely separated below on the caudal portion of the body; the two or three scutes separated on the abdomen by a diameter of the pupil. Margins of the scutes finely ctenoid, their surface somewhat hispid.

Coracoid processes meeting on the breast in the ♀; the inner margin free and overlapping in the ♂.

Distance of the dorsal spine from the snout $2\frac{1}{3}$ in the length; the dorsal spine not flattened, nearly smooth in front, $1\frac{1}{2}$–$1\frac{2}{3}$ in the head; the first and second soft rays highest, higher than the fin's base; the spine of the adipose fin similar to but lower than that of the dorsal fin.

Caudal deeply emarginate.

Anal obliquely rounded, much higher than long.

Ventrals $1\frac{1}{3}$ in the head.

Pectoral spine scarcely flattened, about $1\frac{1}{5}$ in the head in the ♀, little longer in the ♂; its outer margin hispid, its inner finely serrate.

Dark spots along middle of sides, smaller ones on the back and on sides of head, smaller spots on the top of the head; fins nearly plain, transparent, the caudal and pectorals sometimes obscurely spotted,

Head $3\frac{1}{2}$; depth $3\frac{1}{3}$–$3\frac{1}{4}$; D. I, 8; A. I, 7; V. 6; Lat. pl. $\frac{24-25}{23}$.

Fifty-eight specimens. Cudajas; Tabatinga; Porto do Moz.

XCIX. DIANEMA.

Dianema Cope, Proc. Acad. Nat. Sci. Phil. 1871, 276 *(longibarbis)*.

Type: *Dianema longibarbis* Cope.

Maxillary barbels single; two barbels near the symphysis; coracoid process exposed and expanded, covering the entire breast and belly; lateral shields meeting along the median lines of the back and belly. Adipose fin with an anterior spine.

450. Dianema longibarbis.

Dianema longibarbis Cope, l. c, 276, pl. vii, fig. 1-1*b* (Ambyiacu River).

Head depressed, abruptly narrowed in front of the nares; maxillary barbels not reaching the opercular margin. Pectoral spine serrate within, dorsal spine acute, not serrate. Eye $3\frac{3}{4}$ in the head; $2\frac{1}{2}$ in the interorbital.

Yellowish-brown, fins unspotted.

Head $3\frac{2}{3}$; depth $3\frac{2}{3}$; D. I, 7; A. 7; V. 7; P. I, 6; Lat. pl. $\frac{25}{24}$; azygous plates 4. (Cope.)

C. BROCHIS.

Brochis Cope, Proc. Acad. Nat. Sci. Phila. 1871, 277 (*cœruleus*).

Chænothorax Cope, Proc. Am. Philos. Soc. 1878, 679 (*bicarinatus*).

Type: *Brochis cœruleus* Cope.

Habitat: Marañon and tributaries.

This genus differs from *Corydoras* in the number of dorsal rays. The degree of development of the coracoid process in this case cannot be regarded of generic value. The coracoid processes in all the species of this group are exposed; in some (*Brochis*) they cover the entire breast and belly, while in others (*Chænothorax*) they cover them only partially. This character varies with the sex in some species of *Corydoras*, and varies still more in *Hoplosternum thoracatum*.

ANALYSIS OF THE SPECIES OF BROCHIS.

a. A series of plates between the ventrals and anal, another along the sides of the dorsal. Cheeks and snout entirely mailed. Two rictal barbels. D. I, 11. (Castelnau.) (Sub gen. nov. ?) *taiosh* 451.

aa. Lower lateral plates meeting along the median line of the ventral surface.

b. Two rictal barbels; coracoid processes extending to the ventrals, diverging behind, leaving a naked area between them. D. I, 11. (CHÆNOTHORAX.)

c. Eye more than 4 in the head, 2 in the snout, 2 in the interorbital. Two azygous bones between the occipital crest and the dorsal spine. Coracoid plates projecting downward to form an obtuse keel on each side of the belly. Lower lip with a short barbel on each side. Facial ossification extending one-third the distance to the maxillary. (Cope.) *bicarinatus* 452.

cc. Eye 3½ in the head, 1⅔ in the snout and interorbital space. Coracoid processes wide, with convex inner margins, the surface striate. Inferior lip beaded on margin, which easily separates, forming a loop; no median barbel visible. Preorbital bone and shield single, extending half way from orbit to maxillary. (Cope.) *semiscutatus* 453.

bb. A single rictal barbel; two barbels near the symphysis which pass outward and connect with the maxillary barbels for a short distance. Coracoid process covering the entire breast and belly. D. I, 10 or 11. (BROCHIS.)

d. Dorsal I, 10; adipose fin with a membrane; two median barbels on the lower lip. (Cope.) *dipterus* 454.

dd. Dorsal I, 11; adipose fin without a membrane. Short, stout, elevated and compressed; profile convex over the orbits, concave above and below them; maxillary barbels extending to below the middle of the eye. Eye 4 in the head, more than 2 in the snout. Head 3; depth about 2¼; A. 8; V. 6; P. I, 9. (Cope.) *cæruleus* 455.

451. Brochis taiosh.

Callichthys taiosh Castelnau, Anim. de l'Amér. du Sud. pl. 19, fig. 1.

Brochis taiosh Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 165, 1888 (name only).

This species is known only from a drawing; no type is preserved.

452. Brochis bicarinatus.

Chænothorax bicarinatus Cope, Proc. Am. Philos. Soc. 1878, 679 (Peruvian Amazon).

Brochis bicarinatus Eigenm. & Eigenm. l. c. (name only).

This species is known only from Dr. Cope's description.

453. Brochis semiscutatus.

Corydoras semiscutatus Cope, Proc. Acad. Nat. Sci. Philad. 1871, 280, pl. 6, fig. 1 (Ambyiacu River).

Brochis semiscutatus Eigenm. & Eigenm. l. c. (name only).

454. Brochis dipterus.

Brochis dipterus Cope, l. c. 1871, 278 (Ambyiacu River).

455. Brochis cœruleus.

Brochis cæruleus Cope, l. c. 277, pl. vii, fig. 2, and pl. ix, fig. 3 (Ambyiacu River).

CI. CORYDORAS.

Corydoras Lacépède, Hist. Nat. Poiss. v, 145, 1803 (*geoffroy*=*punctatus*).

Hoplisoma Swainson, Fishes, Amph. & Reptiles, ii, 304, 1839 (*punctata*).

Hoplosoma Gill, Syn. Fish. Trinidad, 42, 1858 (*punctata*).

Gasterodermus Cope, Proc. Am. Philos. Soc. 1878, 681 (type ?).

Type: *Corydoras geoffroy* Lacépède.

Dr. Cope proposes the name *Gasterodermus* for those species of the group having the belly covered with skin. As *punctatus*, the type of *Corydoras*, has the belly covered with skin the genus *Gasterodermus* could not be admitted even if the greater or less expansion of the coracoid process were of generic value.

ANALYSIS OF THE SPECIES OF CORYDORAS.

a. Coracoid processes meeting on the median line of the anterior portion of the belly at least.

- *b*. A dark brown lateral band extending from the occiput backwards on the upper half of the body; ventral surface and a broad vertical band behind the eye light; caudal without bars. *eques* 456.
- *bb*. Greenish, fins and top of head brown; a dark-brown band on the caudal. D. I, 9; Lat. pl. $\frac{24}{23}$. (Castelnau.) *splendens* 457.

aa. Coracoid processes nowhere meeting; breast and belly with a median naked area.

- *c*. Caudal fin plain.
  - *d*. Body with one or more dusky longitudinal bands; dorsal fin usually spotted.
    - *e*. Coracoid processes moderately expanded, leaving only a narrow, naked area between them; occipital process triangular, pointed at the tip; a dark band extending from the upper caudal lobe forward, one or more longitudinal series of dark spots along the sides. *elegans* 458.
    - *ee*. Coracoid process scarcely encroaching on the breast or belly; occipital process truncate, about twice as wide at the base as at the tip; a blackish lateral band extending from the middle caudal rays forward; no spots on the sides. *nattereri* 459.

dd. Body without longitudinal bands; dorsal plain. D. I, 7; A. I, 6; P. I, 7–8; V. 6.

f. Head and dorsal plates deep bronze; ventral plates yellowish; all the fins immaculate, opercle, humeral and nuchal plates irridescent blue; base of the dorsal fin shorter than the distance between the dorsal and adipose; depth less than $\frac{1}{6}$ of the total length; eye 4½ in the head, more than two in the interorbital. (Gill.) *æneus* 460.

ff. Olive, the nine or ten anterior scutes with vertical series of blackish spots; base of the dorsal fin equal to the space between the dorsal and adipose fins; depth 3½ in the total length; eye about 3 in the head; spines of the fins very strong and long, dorsal spine as high as the body, pectoral spine shorter; 4–5 azygous shields. (Günther.) *armatus* 461.

cc. Caudal fin with 4–5 dark vertical bars; dorsal with dark markings.

g. Dorsal fin with 2 irregular cross bars; sides of the body with series of dark blotches; middle of the lower fins blackish. *paleatus* 462.

gg. A dark vertical bar on the first dorsal rays sometimes extending on to the body below; anal fin barred or spotted; ventrals and pectorals plain. *punctatus* 463.

ggg. Dorsal with a black spot on ends of rays.

h. Anal spotted; dark brown above, 3 series of dark spots along middle of side. *trilineatus* 464.

hh. Anal plain.

i. Lat. pl. $\frac{22}{21}$; azygous plates none; a pale band on side; clavicle and opercle with blue reflections. (Cope.) *acutus* 465.

ii. Lat. pl. $\frac{21}{19}$; azygous plates 4; numerous black dots on the side shields, which are wanting on middle line of side; a black spot at the base of the dorsal spine. (Cope.) *amphibelus* 466.

ccc. A hastate black spot at base of caudal fin, margined behind by white; a black lateral band. *hastatus* 467.

456. Corydoras eques.

Corydoras eques Steindachner, Ichthyol. Beitr. v, 92, pl. 12, figs 3–3*a*, 1876 (Teffé; Cudajas).

Habitat: Solimoens.

Form heavy forward, decreasing backward; at the dorsal spine high, compressed, the width about 1½ in the greatest depth; the caudal peduncle much compressed, its depth less than half the depth at the dorsal spine.

Head short and very deep, the width nearly equal to its length, the profile convex and steep, especially steep from above the eyes forward; transverse profile strongly arched posteriorly. Occipital process acute, somewhat attenuate, meeting the dorsal plate; the apex of the occipital process usually narrowly truncate, its margins deeply concave, leaving a more convex and larger nuchal plate on either side than in *C. elegans*. Fontanel a short groove between the frontals and the anterior part of the occipital bone; usually shorter than the orbit in the ♂, about equal to the orbit in the ♀, the bones nearly grown together, leaving a short, very narrow slit. Suborbital bone nearly smooth, very broad, exceeding the orbital diameter; head everywhere mailed except at tip of snout.

Inner rictal barbels extending backward about to posterior rim of orbit; lower lip free, and with a pair of barbels two-thirds as long as the orbit.

Eye lateral, circular, 1½ in the snout, 3½ in the head, 2 in the interorbital.

Mouth inferior, very small, the intermaxillaries vestigiary.

Lateral scutes overlapping on the back behind the dorsal fin, 3–4 azygous plates before the adipose fin.

Coracoid processes meeting evenly for their anterior half, diverging backward.

Distance of the dorsal spine from the snout 2–2⅕ in the length; the spine not flattened, smooth in front, minutely serrate behind, higher than the rays, 1–1⅕ in the head, the rays decreasing backward to the last, which is 2–2½ in the spine.

Spine of the adipose fin hispid on its basal margins like the dorsal plates which precede it.

Caudal forked, about 2¾ in the length.

Anal rounded, higher than long, the first ray flattened spine-like.

Ventrals 1⅓–1½ in the head, the outer ray stiffened and bristly.

Pectoral spine smooth on its outer margin and sides, with short blunt teeth on the center of its inner edge, sometimes obsolete or sometimes fine, pointed teeth toward the tip; pectoral spine longer than the dorsal spine, about 3 in the length.

Sides dark brown to the humeral process, this color becoming almost black where it meets across the occipital process forming an acute angle on the posterior portion of the occipital bone; the dorsal plate and thence a narrow area backward to the caudal fin light brown; a yellow band meets across the fontanel, broadening as it extends downward across the humeral process whence it merges into the light ventral color; interorbital, cheeks and snout punctate with brown, sometimes forming a somewhat darker streak through cheeks and eyes; ventrals yellow; other fins more or less punctate with brown.

The ♀ differs in having the suborbital bone much narrower, less than the orbital diam. leaving a naked area below, the tip of the snout more pointed, the dorsal and pectoral spines shorter, the coracoid processes meeting evenly throughout most of their length. The color likewise differs; the dark brown lateral band being much narrower, not extending to the lateral line, leaving the lower series of scutes wholly light colored.

Head $3\frac{1}{2}$–$3\frac{3}{4}$; depth $2\frac{2}{3}$–3; D. I, 8; A. I, 7; V. I, 5. Lat. pl. $\frac{21-22}{20}$

Fourteen specimens. Cudajas; Thayer & Bourget.

457. Corydoras splendens.

Callichthys splendens Castelnau, Anim. de l'Amér. du Sud, 39, pl. 18, fig. 3 (Rio Tocantins).

Corydoras splendens Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 165, 1888 (name only).

Habitat: Rio Tocantins.

This species is known only from the description and figure of Castelnau.

458. Corydoras elegans.

Corydoras elegans Steindachner, SB. Ak.Wien, lxxiv, 1876, Ichthyol. Beiträge, v, 93 (Cudajas; Teffé).

Habitat: Cudajas to Teffé.

Snout compressed; head as deep as long, its width 1¼ in its length; profile steep, little arched except at the snout; fontanel long, linear, extending some distance into the occipital bone; occipital process broad at the base, tapering to a point, its margins straight. Top of the head with numerous mucous pores.

Eye large, 1⅓ in the snout, 3½ in the head, 2 in the interorbital. Snout acute; mouth small, premaxillaries expanded, covering the mouth when closed.

Inner rictal barbel reaching about to the gill-openings; lower lip broad, free, terminating in two barbels.

Two or three azygous plates before the adipose fin.

First plate of the lower series expanded below, with the coracoid process encroaching upon the breast and belly, leaving a rather narrow naked interspace.

Distance of the dorsal spine from the snout 2 in the length; the spine shorter than the head, roughened on its outer margin, and near the tip on its inner margin, dorsal rays higher than the spine, when depressed almost reaching the adipose fin.

Caudal deeply forked, 2½ in the length.

Pectoral spine longer than the dorsal spine, reaching to or past base of ventrals, its inner margin serrate, its outer margin bristly.

Light brown; median line of the back darker brown, sometimes wanting, a broader band of dark extends from the upper caudal lobe forward, broadening anteriorly; two or three series of dark spots form lines near the lateral line; these series sometimes more or less indistinct; caudal and lower fins plain yellowish; dorsal fin very variable, sometimes plain light, sometimes with its base dark and a large dark spot anteriorly, again with four dark brown cross-bars alternating with transparent.

Head $3\frac{1}{2}$–4; depth $2\frac{3}{4}$; D. I, 7–8; A. I, 7; V. 6; P. I, 6–7. Lat. pl. $\frac{23}{20}$.

Five hundred and thirty-four specimens. Cudajas.

459. Corydoras nattereri.

Corydoras nattereri Steindachner, Ichthyol. Beiträge, v, 95. pl, xi, figs. 1–1b (Rio Janeiro); Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 165, 1888 (Rios Doce and Parahyba).

Habitat: Rio Janeiro to the Rio Doce.

Short and deep, rapidly tapering to the caudal peduncle. Head as deep as long, its width little less than its length; profile evenly arched; fontanel small, between the occipital and frontal bones; opercles and suborbitals exposed; width of the occipital $1\frac{3}{4}$ in its length to tip of occipital process; occipital process about twice as wide at base as at tip.

Eye $1\frac{1}{2}$ in the snout, 4 in the head, 2 in the interorbital.

Snout rather blunt; rictal barbels scarcely reaching the gill-openings. Lower lip broad, free, terminating in a pair of rather long barbels.

Coracoid processes scarcely encroaching on breast and belly.

Three or four azygous plates before the adipose fin.

Distance of the dorsal spine from the snout 2 in the length; the spine $1\frac{1}{3}$ in the head, smooth in front, slightly roughened behind; first ray higher than the spine.

Caudal deeply forked, $2\frac{1}{2}$ in the length.

Pectoral spine similar to the dorsal spine, somewhat longer, its inner margin strongly serrate.

Light brown, a blackish lateral band; a dusky spot at base of dorsal spine; anterior dorsal ray dusky; other fins plain.

Head 3½; depth $2\frac{4}{5}$–$2\frac{3}{5}$; D. I, 7–8; A. 7; V. 6; P. I, 8. Lat. pl. $\frac{22}{20}$.

Three specimens .05 m. Rio Doce; Rio Parahyba. Thayer Expedition.

460. Corydoras æneus.

Hoplosoma æneum Gill, Syn. Fish. Trinidad, 43, 1858 (Trinidad, W. I.).

Callichthys æneus Günther, v, 230, 1864 (copied).

Corydoras æneus Jordan, Proc. U. S. Nat. Mus. 1886, 560 (name only).

Habitat: Trinidad.

This species is known only from the types.

461. Corydoras armatus.

Callichthys armatus Günther, Proc. Zool. Soc. Lond. 1868, 230, fig. 1 (Xeberos and Huallaga).

Gasterodermus armatus Cope, Proc. Amer. Philos. Soc. xvii, 681, 1878 (Nauta).

Corydoras armatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 166, 1888 (name only).

Habitat: Marañon and its tributaries.

462. Corydoras paleatus.

Callichtys punctatus (not of Bloch), Valenciennes, Voy. d'Orbigny, ix, Atlas ii, pl. v, fig. 1, 1847; Cuv. & Val. xv, 318, 1840 (? Surinam ; Monte Video).

Callichthys paleatus Jenyns, Voy. Beagle, iv, 113, 1842 (loc. ?); Günther, v, 230, 1864 (copied); Hensel, Wiegm. Arch. 1870, i, 71 (Porto Alegre).

Corydoras paleatus Eigenm. & Eigenm. l. c. (Uraguay).

Corydoras marmoratus Steindachner, Denk. Ak. Wien, 1879, 26, pl. v, fig. 1 (La Plata).

Habitat: La Plata and tributaries.

As the description of *paleatus* exactly describes Steindachner's plate of *marmoratus* and our specimens, we have identified *marmoratus* with *paleatus*.

Body short, chubby; ventral outline almost straight; profile steep, evenly arched; occipital tapering into a pen-shaped occipital process; fontanel elongate.

Eye 1½ in the snout, 3½ in the head, 1½ in the interorbital. Snout acute. Rictal barbels not extending beyond the eye; lower lip ending in two small barbels. Breast and belly entirely covered with skin.

Dorsal fin when depressed reaching the adipose fin. A rather broad naked area between the dorsal and adipose fins.

Brown; a series of large dark spots along the sides, with a corresponding series of smaller spots on the back and below; center of the lower fins blackish; caudal and dorsal fins marbled with dark.

Head 3; depth $2\frac{4}{5}$; D. I, 7; A. 7; Lat. pl. $\frac{2\ 3}{2\ 1}$.

Three specimens .02 m. Uruguay. Professor Wyman.

463. Corydoras punctatus.

Cataphractus punctatus Bloch, pl. 377, fig. 2; Bloch & Schneider, "Syst. Ichthyol. 108," 1801; Lacépède, Hist. Nat. Poiss. v, 125, 1803 (Surinam).

Hoplisoma punctata Swainson, Nat. Hist. Fish. etc. ii, 304, 1839 (name only).

Callichthys punctatus Günther, Cat. Fish. Brit. Mus. v, 329, 1864 (Essequibo).

Corydas punctatus Eigenm. & Eigenm. Proc. Cal. Acad. 2d Ser. i, 166, 1888 (José Fernandez).

Corydoras geoffroy Lacépède, Hist. Nat. Poiss. v, 147, 1803 (loc.?).

Corydoras ambiacus Cope, Proc. Acad. Nat. Sci. Philad. 1871, 280 (Ambyiacu River).

Gasterodermus ambiacus Cope, Proc. Am. Philos. Soc. xvii, 1878, 681 (Nauta).

Habitat: Guiana; Solimoens and Marañon.

Corydoras ambiacus Cope, is probably the male of *punctatus*. The description of that species agrees with the description given by Günther and with our specimens.

Short and deep; head as deep as long; profile very steep, rounded above and in front of the eyes; fontanel elongate, extending into the occipital bone; the width of the occipital equals its length to the tip of the process, its margins regularly concave. A conspicuous mucous canal extends from the anterior nares back and down behind the eye.

Eye large, $1\frac{1}{2}$ in the snout, $3\frac{1}{3}$ in the head, $1\frac{2}{3}$ in the interorbital. Snout compressed, pointed; preorbitals very narrow, rictal barbels extending about to the gill-opening, the outer one brown, the inner white; lower lip broad, free, terminating in two barbels; upper surface of the maxillary bones with fine bristles.

Coracoid process scarcly encroaching on the breast or belly.

Two or three azygous plates in front of the adipose fin.

Distance of the dorsal spine from the snout 2 in the length; dorsal spine little if any shorter than the head, its anterior margin smooth, its posterior margin finely serrate; first two dorsal rays higher than the spine.

Caudal deeply forked, 2$\frac{1}{3}$ in the length.

Pectoral spine similar to and little longer than the dorsal spine.

Light brown, sides and back with blackish-brown spots; a dark vertical bar below the eyes; occiput blackish; a dark brown vertical bar on the first two dorsal rays, sometimes continued on the sides, the remainder of the fin plain or spotted with dark brown; caudal with 4–5 dark brown cross-bars; anal barred or spotted with brown; other fins plain; opercle and humeral process with silvery reflections.

Head 3$\frac{1}{4}$; depth 2$\frac{3}{4}$–3; D. I, 8; A. 8; V. 6; P. I, 8–9; Lat. pl. $\frac{25 \cdot 23}{23 \cdot 21}$.

Six specimens .045–.05 m. José Fernandez. Maj. Coutinho.

464. Corydoras trilineatus.

Corydoras trilineatus Cope, Proc. Acad. Nat. Sci. Phila. 1871, 281, pl. 6, fig. 2 (Ambyiacu).

Corydoras agassizii Steindachner, Ichthyol. Beitr. v, 90 and 186, pl. 12, figs. 2–2*a* (Tabatinga).

Habitat: Marañon and its tributaries.

Dr. Cope's figure represents an individual .049 m. long; it has the snout blunt and eye large. Dr. Steindachner figured an individual .07 m. long, which has a longer snout and smaller eye, but on page 186, l. c., Dr.

Steindachner states that in younger individuals the snout is strongly curved and steep. These two figures undoubtedly refer to the same species.

465. Corydoras acutus.
Corydoras acutus Cope, l. c. (Ambyiacu River).
Habitat: Ambyiacu River.

466. Corydoras amphibelus.
Corydoras amphibelus Cope, Proc. Acad. Nat. Sci. Phila. 1871, 282 (Ambyiacu River).
Habitat: Ambyiacu River.

467. Corydoras hastatus.
Corydoras hastatus Eigenm. & Eigenm. Proc. Cal. Acad. Sci. 2d Ser. i, 166, 1888 (Villa Bella).
Habitat: Villa Bella.

Compressed, comparatively slender. Head as deep as long, its width 1⅓ in its length; profile straight, steep; occipital process triangular; fontanel elongate, extending into the occipital bone; preorbital small.

Eye large, 1½ in the snout, 3½ in the head, 2 in the interorbital. Snout little decurved; rictal barbels not extending beyond the eye; lower lip terminating in two barbels.

Coracoid processes striate, forming a ridge on the sides of the belly.

Distance of the dorsal spine from the snout 2 in the length; the dorsal spine little shorter than the head.

Caudal deeply forked, 2¾ in the length.

Pectoral spine little longer than the dorsal spine, weakly serrate along both margins.

Light brown; a jet black lateral band terminating at the base of the caudal in a large arrow-shaped spot which is bordered posteriorly with white, which itself is narrowly margined with blackish, the caudal dusky beyond; a jet black line extends on either side from a short distance behind the ventrals to behind the anal fin; body and fins everywhere covered with minute black points. Head 3⅓; depth 2¾; D. I, 7–8; A. 7–8; Lat. pl. $\frac{22}{20}$.

Two specimens .022 m. Villa Bella. Prof. L. Agassiz.

LIST OF CENTRAL AMERICAN AND MEXICAN NEMATOGNATHI.

AMIURUS Rafinesque.

Amiurus dugesi Bean—Rio Turbio; Guanajuato, Mexico, west of the Sierra Madre. Proc. U. S. Nat. Mus. 1879, 304.

ICTALURUS Rafinesque.

Ictalurus meridionalis (Günther)—Rio Usumacinta, Guatemala. Cat. Fish. Brit. Mus. v, 102, 1864.

RHAMDELLA E. & E.

Rhamdella parryi E. & E.—Rio Zanaleneo near Tonala, Chiapas, Mexico. Proc. Cal. Acad. Sci. 2d Ser. i, 130.

Rhamdella petenensis (Günther)—Lake Peten; Chiapas, Mexico. l. c. 126. [*]

Rhamdella brachyptera (Cope)—Mexico. Trans. Am. Philos. Soc. xiii, 404.

Rhamdella baronis mülleri (Troschel)—Pacific coast of Mexico. Müller, Wierbelth. Mex. 102, 1865. [‡]

Rhamdella guatemalensis (Günther)—Huamuchal; Guatemala; Nicaragua. l. c. 122.

Rhamdella salvini (Günther)—Rio San Geronimo, Guatemala. l. c. 130.

Rhamdella polycaulus (Günther)—Rio San Geronimo. l. c. 131.

Rhamdella managuensis (Günther)—Lake Managua. Fish. Central America, 393 and 476, 1866.

Rhamdella hypselurus (Günther)—Mexico. Cat. Fish. Brit. Mus. v, 126.

Rhamdella motaguensis (Günther)—Rio Motagua. l. c. 127.

Rhamdella laticauda (Heckel)—Mexico. Günther, l. c. 127.

Rhamdella nicaraguensis (Günther)—Lake Nicaragua. l. c. 125.

Rhamdella micropterus (Günther)—Rio San Geronimo. l. c. 124.

Rhamdella godmanni (Günther)—Lower Vera Paz; Rio Motagua; Mexico. l. c. 124.

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[*] The difference between *Rhamdia* and *Rhamdella* lies in the fontanels. In *Rhamdia* there is a frontal fontanel only, in *Rhamdella* both frontal and occipital fontanels are present. Only the above two species of those inhabiting this region have been examined in this respect. It is doubtful therefore whether the following ones should be placed in one genus or the other.

[‡] We have not seen this paper and know nothing of this fish.

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The following list of papers was not compiled till after we had removed from the vicinity of all large libraries. For this reason and because some papers we have never seen, the titles of several works are not as complete as they should be. It is hoped, however, that this catalogue of works will serve the purpose for which it was intended.

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ERRATA.

P. 11, third line from top, read PYGIDIIDÆ for PYGIDIDÆ.

P. 11, twelfth line from top, read *Pygidiinæ* instead of *Pygidinæ*.

P. 11, fourteenth line from top, read *Stegophelinæ* instead of *Stegophelini*.

P. 43, eleventh line from bottom, read *peruvianus* instead of *peruanus*.

P. 53, eleventh, fifteenth and sixteenth lines from bottom, read *temminckianus* instead of *temminkianus*.

P. 317, twelfth line from top, read (PYGIDIINÆ) instead of (PYGIDINÆ).

P. 341, add first line Subfamily STEGOPHILINÆ.

P. 358, twelfth line from top, read **oxyrryncha** instead of **oxyrrhynchus**.

P. 358, thirteenth line from top, read *oxyrryncha* instead of *oxyrrhynchus*.

P. 392, seventh line from top, read **Parotocinclus** instead of **Hisonotus**.

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